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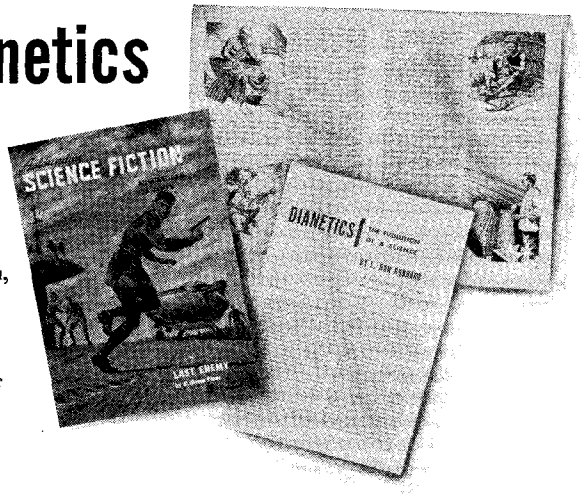

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CHOICE

As our regular readers are aware, we frequently have non-illustrative covers. This month's cover was painted by Pattee last summer, before the Korean incident started. Some citizens of this planet seem to decide that there is danger only when the shooting starts; most of us, however, are able to recognize the existence of the situation, inherent in the conflicting illogics of different people and the rigorous logic of material things and technology.

There is an old saying, "A man has a right to his opinions." That is true only in a limited sense—and that is something many people prefer not to admit. No man has any right whatever to any opinions about demonstrable facts. No man, for instance, has any right to an opinion about the explosibility of U-235; the subject is not open to opinion. There can be no opinions about the existence of the force of gravity; it does not exist by reason of human belief or knowledge. There is an inherent difference between that which is invented and that which is discovered. The psychotic who believes that the law of gravity does not apply to him—that he can float out a tenth story window—will hit the pavement with precisely the same devastating result experienced by a careless window washer who does acknowledge the existence of the fact. It is not a matter of opinion.

A man does *not* always have a right to his opinions.

And even in the field of statements of fact, there are immensely important differences that people all too often overlook. For instance, what is the inherent difference in type of fact-statement between:

"Granite sinks in water," and

"*Though* is spelled t-h-o-u-g-h."

Most adults who have had any training in thinking can distinguish the statement-of-observed-fact and the statement-of-agreed-definition, when they are that sharply differentiated. But a very large part of the world's present troubles rests on the fact that a large number of people do not recognize into which class the statement "A man has a right to . . ." belongs. Because they do not recognize that the statement is *not* a state-

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ment of fact under any circumstances whatever, but a statement of a *proposed* definition, or a *proposed* axiom, some completely meaningless arguments, devoid of any logical basis whatsoever, have taken off.

Because there is no definition of "right" to be found in any absolute terms, the term cannot be used in any logical way. Grammatically the term "righter" and its antonym "wronger" are indefensible; logically, the terms "right" and "wrong" are indefensible. And most unfortunately, the term "right" is so much more soul-satisfying, emotionally soothing, than that doubt-filled concept "righter" or "more nearly correct." An argument in which the debaters confined themselves properly and logically to the terms "righter" and "wronger" and similar recognition of their own not-absolute knowledge, understanding, and data would have none of the resounding, heart-warming conviction of positive absolute statements. Logic is intellectual and repellent to most of Mankind, unfortunately; propaganda is so much more sure of itself, so vastly more comfortable an armor of righteous conviction. The logician is sorely tried indeed when he meets an untrammeled propagandist in debate.

The propagandist knows he is right, unshakeably and eternally right. The logician inspects the validity of his own premises, a performance that is emotionally uncomfortable to most people.

But the scientist is a different case; *he* does not inspect the validity of his own premises—Nature does that for him in a very arbitrary and final manner. If his premises are wrong, he finds out in quite absolute terms; the proposed mechanism does not function.

A scientist is not actually required to be a very careful logician; he'll be brought up short and sharp if he starts off on a wild tangent.

But the man who deals in human relations is not so constrained—or, perhaps, we should say he has not been so constrained.

He is, now. The mind and nerves of men control the atom; that is a force of science, of a field where logic is forced to be correct, or nonfunctional. If equal rigor of logic is not soon applied in the field of human relationships, the present position of choice will have been lost.

For science is a field wherein man has no right to opinion; it is coldly, inhumanly logical, and Nature is ruthlessly final in rejecting false answers. It was the men who ruled in the field of human relationships who decided to enmesh human affairs in the forces of science. They now have their choice; to accept and apply the cold, thin logic of "righter" and "wronger"—or the well-worn, heart-warming fallacies of eternal right and everlasting wrong. Heart-warming—and now at its heart glows the 10,000,000,000 degrees heat of nuclear fission.

THE EDITOR.

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THE TRUTH ABOUT CUSHGAR

BY JAMES H. SCHMITZ

***Sometimes** it isn't good national policy to win too easily — and sometimes the most powerful weapon is the enemy's conviction that he doesn't understand . . .*

Illustrated by Ward

There was, for a time, a good deal of puzzled and uneasy speculation about the methods that had been employed by the Confederacy of Vega in the taming of Cushgar. The disturbing part of it was that nothing really seemed to have happened!

First, the rumor was simply that the Confederacy was preparing to move into Cushgar—and then, suddenly, that it *had* moved in! This aroused surprised but pleased interest in a number of areas bordering the Confederacy. The Thousand Nations and a half-dozen similar organizations quietly flexed their military muscles, and prepared to land in the middle of the Confederacy's back as soon as it became fairly engaged in its ambitious new project. For Cushgar and the Confederacy seemed about as evenly matched as any two powers could possibly be.

But there was no engagement, then. There was not even anything resembling an official surrender. Star system by system, mighty Cushgar was accepting the governors installed by the Confederacy. Meekly, it coughed up what was left of the captive peoples and the loot it had pirated for the past seven centuries. And, very simply and quietly then, under the eyes of a dumfounded galaxy, it settled down and began mending its manners.

Then the rumors began! The wildest of them appeared to have originated in Cushgar itself, among its grim but superstitious inhabitants.

The Thousand Nations and the other rival combines gradually re-

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laxed their various preparations and settled back disappointedly. This certainly wasn't the time to jump! The Confederacy had sneaked something over again; it was all done with by now.

But *what* had they done to Cushgar—and how?

In the Confederacy's Council of Co-ordinators on Vega's planet of Jeltad, the Third Co-ordinator, Chief of the Department of Galactic Zones, was being freely raked over the coals by his eminent colleagues.

They, too, wanted to know about Cushgar; and he wasn't telling.

"Of course, we're not actually accusing you of anything," the Fifth Co-ordinator — Strategics — pointed out. "But you didn't expect to advance the Council's plans by sixty years or thereabouts without arousing a certain amount of curiosity, did you?"

"No, I didn't expect to do that," the Third Co-ordinator admitted.

"Come clean, Train!" said the First. Train was the name by which the Third Co-ordinator was known in this circle. "How did you do it?" Usually they were allies in these little arguments, but the First's curiosity was also rampant.

"Can't tell you!" the Third Co-ordinator said flatly. "I made a report to the College, and they'll dish out to your various departments whatever they ought to get."

He was within his rights in guarding his own department's secrets, and they knew it. As for the College—

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that was the College of the Pleiades, a metaphysically inclined body which was linked into the affairs of Confederacy government in a manner the College itself presumably could have defined exactly. Nobody else could. However, they were the final arbiters in a case of this kind.

The Council meeting broke up a little later. The Third Co-ordinator left with Bropha, a handsome youngish man who had been listening in, in a liaison capacity for the College.

"Let's go off and have a drink somewhere," Bropha suggested. "I'm curious myself."

The Co-ordinator growled softly. His gray hair was rumpled, and he looked exhausted.

"All right," he said. "I'll tell *you*—"

Bropha's title was President of the College of the Pleiades. That was a good deal less important than it sounded, since he was only the executive scientist in charge of the College's mundane affairs. However, he was also the Third Co-ordinator's close personal friend and had been cleared for secrets of state of any kind whatsoever.

They went off and had their drink.

"You can't blame them too much," Bropha said soothingly. "After all, the conquest of Cushgar has been regarded pretty generally as the Confederacy's principal and most dangerous undertaking in the century immediately ahead. When the Department of Galactic Zones pulls it off suddenly—apparently without preparation or losses—"

"It wasn't without losses," the Co-ordinator said glumly.

"Wasn't it?" said Bropha.

"It cost me," said the Co-ordinator, "the best Zone Agent I ever had—or ever hope to have. Remember Zamm?"

Bropha's handsome face darkened.

Yes, he remembered Zamm! There were even times when he wished he didn't remember her quite so vividly.

But two years would have been much too short an interval in any case to forget the name of the person who had saved your life—

At the time, the discovery that His Excellency the *Illustrious* Bropha was lost in space had sent a well-concealed ripple of dismay throughout the government of the Confederacy. For Bropha was destined in the Confederacy's plans to become a political figure of the highest possible importance.

Even the Third Co-ordinator's habitual placidity vanished when the information first reached him. But he realized promptly that while a man lost in deep space was almost always lost for good, there were any number of mitigating factors involved in this particular case. The last report on Bropha had been received from his personal yacht, captained by his half brother Greemshard; and that ship was equipped with devices which would have tripped automatic alarms in monitor-stations thousands of light-years apart if it had been suddenly destroyed or incapacitated by any unforeseen ac-

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cident or space attack.

Since no such alarm was received, the yacht was still functioning undisturbed somewhere, though somebody on board her was keeping her whereabouts a secret.

It all pointed, pretty definitely, at Greemshard!

For its own reasons, the Department of Galactic Zones had assembled a dossier on Bropha's half brother which was hardly less detailed than the information it had available concerning the illustrious scientist himself. It was no secret to its researchers that Greemshard was an ambitious, hard-driving man, who for years had chafed under the fact that the goal of his ambitions was always being reached first and without apparent effort by Bropha. The study of his personality had been quietly extended then to a point where it could be predicted with reasonable accuracy what he would do in any given set of circumstances; and with the department's psychologists busily dissecting the circumstances which surrounded the disappearance of Bropha, it soon became apparent what Greemshard had done and what he intended to do next.

A prompt check by local Zone Agents indicated that none of the powers who would be interested in getting Bropha into their hands had done so as yet, and insured, furthermore, that they could not do so now without leading the Confederacy's searchers directly to him. Which left, as the most important remaining difficulty, the fact that the number of places where the vanished yacht could be kept unobtrusively concealed was enormously large.

The number was a limited one, nevertheless—unless the ship was simply drifting about space somewhere, which was a risk no navigator of Greemshard's experience would be willing to take. And through the facilities of its home offices and laboratories and its roving army of Agents, the Third Department was equipped, as perhaps no other human organization ever had been, to produce an exact chart of all those possible points of concealment and then to check them off in the shortest possible time.

So the Co-ordinator was not in the least surprised when, on the eighth day of the search instigated by the department, a message from Zone Agent Zamman Tarradang-Pok was transferred to him, stating that Bropha had been found, alive and in reasonably good condition, and would be back in his home on Jeltad in another two weeks.

"In a way, though, it's too bad it had to be that space-pixy Zamm who found him!" one of the Co-ordinator's aides remarked.

And to that, after a moment's reflection, the Chief of Galactic Zones agreed.

II.

The moon where Bropha's yacht lay concealed was one of three approximately Earth-sized, ice-encrusted satellites swinging about the sullen glow of a fiery giant-planet.

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The robot-ship of Zone Agent Zamman Tarradang-Pok, working along its allotted section of the general search-pattern, flashed in at the moon on a tangent to its orbit, quartered its surface in two sweeping turns and vanished again toward the nearer of the two other satellites.

All in all, that operation was completed in a matter of seconds; but before the ship left, Zone Agent Zamm had disembarked from it in a thirty-foot space-duty skiff—crammed to its skin just now with the kind of equipment required to pull off a miniature invasion-in-force. Whatever sort of camouflaged power station was down there had been shut off the instant it detected her ship's approach. While that didn't necessarily reveal a bad conscience, the momentary pattern of radiations Zamm's instruments had picked up suggested an exact duplicate of the type of engines which powered Bropha's yacht.

So it probably was the yacht, Zamm decided—and it would be hidden just below the moon's frozen surface! She had pin-pointed the spot; and on the opposite side of the big satellite the skiff came streaking down into a thin, icy atmosphere.

"You can start hoping that ship was one of those I've been waiting for!" Greemshard was remarking meanwhile. "Or else just somebody who isn't interested in us."

He stood in the center of the yacht's control room, staring at Bropha with intense dislike and a touch of fear. A suspicion had begun to grow on Greemshard that with all his cleverness and planning he might have worked himself at last into an impossible situation! None of the dozens of coded messages he had sent out during the past few days had been answered or perhaps even received. It was a little uncanny.

"Whatever happens," he concluded, "they're not getting you back alive!"

Bropha, flattened by gravity shackles to one wall of the room, saw no reason to reply. For the greater part of the past week, he had been floating mentally in some far-off place, from where he detachedly controlled the ceaseless complaints of various abused nerve-endings of his body. His half brother's voice hardly registered. He had begun to review instead, for perhaps the thousandth futile time, the possibilities of the trap into which he had let Greemshard maneuver him. The chances were he would have to pay the usual penalty of stupidity, but it was unlikely that either Greemshard or his confederates would get any benefit out of that.

Bropha was quite familiar—though Greemshard was not—with the peculiar efficiency of the organization headed by his friend, the Third Coordinator.

"Do not move, Captain Greemshard!"

That was all that tinkling, brittle voice really said. But it was a moment or so before Bropha grasped

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the meaning of the words.

He had, he realized, been literally shocked into full consciousness by something that might have been the thin cry of a mindless death as it rose before its victim—a sound that ripped the clogging pain-veils from his thoughts and triggered off an explosion of sheer animal fright! Bropha's brain was a curiously sensitive tool in many ways; it chose to ignore the explicit substance of Zamm's curt warning and, instead, to read in it things like an insatiable hunger, and that ultimate threat! And also, oddly enough, a wailing, bleak despair.

Later on, he would admit readily that in his wracked condition he might have put a good deal more into the voice than was actually there. He would point out, however, that Greemshard, who was not an imaginative man and recklessly brave, seemed to be similarly affected. His half brother, he saw, stood facing him some twenty feet away, with his back to the door that led from the control room into the main body of the yacht; and the expression on his face was one Bropha could never remember afterwards without a feeling of discomfort. There was an assortment of weapons about Greenshard's person and on a desk to one side and within easy reach of him; but for that moment at least he did not move.

Then Bropha's startled gaze shifted beyond Greemshard.

The passage door had disappeared, and a pale-green fire was trickling swiftly from about its frame. He saw Zone Agent Zamm next, standing just beyond the door with a gun in her hand, and several squat, glittering shapes looming up behind her. The shock of almost superstitious fear that had roused him left Bropha in that instant, because he knew at once who and what Zamm was.

At about the same moment, Greemshard made his bid—desperately and with the flashing speed of a big, strong animal in perfect condition.

He flung himself sideways to reach the floor behind the desk, one hand plucking at a gun in his belt; but he was still in mid-leap when some soundless force spun him about and hurled him across the room, almost to Bropha's feet. What was left of Greemshard lay twitching there violently for a few seconds more, and was still. A faint smell of ozone began to spread through the room.

Bropha looked down at the headless body and winced. As children and half-grown boys, he and Greemshard had been the best of friends; and later, he had understood his half brother better than Greemshard ever knew. For a moment at least, the events of the last few days seemed much less important than those years that were past.

Then he looked back at the figure behind the coldly flaming door frame across the room and stammered: "Thank you, Zone Agent!"

His first glance at Zamm had showed him that she was a Daya-Bal; and up to that moment he would have thought that no branch of hu-

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manity was emotionally less suited than they to perform the duties of an Agent of Galactic Zones. But under the circumstances, the person who had effected an entry into that room, in the spectacularly quiet and apparently instantaneous fashion which alone could have saved his life, was not likely to be anything else.

Like a trio of goblin hounds, three different pieces of robotic equipment came variously gliding and floating through the glowing door frame on Zamm's heels, and began to busy themselves gently about a now rather shock-dazed Bropha. His rescuer, he found himself thinking presently, seemed really more bizarre in these surroundings than her mechanical assistants!

Zamm was not in armor but in a fitted spacesuit, so her racial characteristics were unmistakable. By ordinary human standards, the rather small Daya-Bal body was excessively thin and narrow; but Zamm's white face with its pale eyes and thin, straight nose matched it perfectly, and every motion showed the swift, unconscious grace which accounted for some of the fascination her people exerted on their more normally constructed cousins. Bropha, who had spent over a year among the Daya-Bal planets in the Betelgeuse region, and during that time had also come under the spell of what was perhaps the youngest true branch of *Genus Homo,* addressed Zamm, by and by, in her own language.

He noted her smile of quick pleasure and the flash of interest in her eyes, and listened carefully to her reply, which began as an apology for causing irreparable damage to his ship in the process of boarding it. Such responses all seemed disarmingly normal; and he felt unable to recapture the sensations which had awakened him so suddenly when he heard her challenge to Greemshard.

Greemshard's death, too—however he might feel about it personally—was, after all, simply the fate of a criminal who had been misguided enough to resist certain arrest. As it happened, Bropha never did learn the exact circumstances under which the four members of Greemshard's little gang, who were acting as the yacht's crew, had departed this life just before Zamm appeared at the control room; but it could be assumed that the situation there had been a somewhat similar one.

His explanations, however, completely failed to satisfy him—because he knew the Daya-Bals.

He spent most of the two weeks required for the return trip to Jeltad in a bed under robotic treatment.

The physical damage his misadventure had cost him wasn't too serious, but it had to be repaired promptly; and such first-aid patchwork usually involved keeping a human brain anaesthetized to the point of complete unconsciousness. But Bropha's level of mind-training permitted him to by-pass that particular effect, and to remain as aware of his

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surroundings as he chose to be; and he remained much more aware of them than Zamman Tarradang-Pok or her robots appeared to realize.

To the average bedridden traveler, that endless drive on a silent ship through the unreal-seeming voids of the overspeed might have seemed monotonous to the point of dreary boredom. Bropha—alert, wondering and reflecting—soon gained a different impression of it. Little enough was actually happening; but even the slightest events here seemed weighted to him with some abnormal dark significance of their own. It was almost, he thought, as if he were catching an occasional whispered line or two of some grim drama — the actors of which moved constantly all about him but were very careful to stay out of his sight!

One day, finally, his watching was briefly rewarded; though what he observed left him, if anything, more puzzled than before. But afterwards, he found that faint echo of the chill Zamm's voice first aroused in him had returned. In his mind, it now accompanied the slight shape which came occasionally through the shadowed passage before his cabin and, much more rarely, paused there quietly to look in on him.

Simultaneously, he discovered that a sense of something depressing and frightening had crept into his concept of this stupendously powered ship of Zamm's, with its electronic mentality through which sensations and reflexes flashed in a ceaseless billionfold shift of balances, over circuits and with meanings to which nothing remotely like a parallel existed in any human brain. Its racing drive through apparent nothingness, at speeds which no longer could be related mentally to actual motion, was like the expression of some fixed, nightmarish purpose which Bropha's presence had not changed in any way. For the moment, he was merely being carried along in the fringe of the nightmare—soon he would be expelled from it.

And then that somehow terrible unit, the woman of a race which mankind had long regarded as if they were creatures of some galactic Elfland—beings a little wiser, gentler, a little farther from the brute than their human brothers—and her train of attendant robots, of which there seemed to be a multi-shaped, grotesque insect-swarm about the ship, and finally the titanic, man-made monster that carried them all, would go rushing off again on their ceaseless, frightening search.

For what?

Without being able to give himself a really good reason for it even now, Bropha was, in brief, profoundly disturbed.

But one day he came walking up into the control room, completely healed again, though still a little uncertain in his stride and more than a little dissatisfied in his thoughts. Vega was now some twenty-five light-years away in space; but in the foreshortening magic of the ship's vision tank, its dazzling, blue-white brilliance floated like a three-inch

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fire-jewel before them. A few hours later, great Jeltad itself swam suddenly below with its wind-swept blues and greens and snowy poles—to the eyes of the two watchers on the ship much more like the historical Earth-home of both their races than the functional, tunneled hornet-hive of Terra was nowadays.

So Bropha came home. Being Bropha, his return was celebrated as a planetary event that night, centered about a flamboyant festival at his fine house overlooking the tall, gray towers of Government Center. Being also the Bropha who could not leave any human problem unsettled, once it came to his attention, he tried to make sure that the festival would be attended both by his rescuer and by her boss—his old friend, the Third Co-ordinator of the Vegan Confederacy.

However, only one of them appeared.

"To tell you the truth," Bropha remarked, "I didn't expect her to show up. And to tell you the truth again, I feel almost relieved, now that she didn't." He nodded down at the thronged and musical garden stretches below the gallery in which they sat. "I can't imagine Zamm in a setting like that!"

The Co-ordinator looked. "No," he agreed thoughtfully; "Zamm wouldn't fit in."

"It would be," said Bropha, rather more dramatically than was customary for him, "like seeing some fever-dream moving about in your

everyday life—it wouldn't do!"

"So you want to talk about her," the Co-ordinator said; and Bropha realized suddenly that his friend looked soberly amused.

"I do," he admitted. "In fact, it's necessary! That Agent of yours made me extremely uneasy."

The Co-ordinator nodded.

"It hasn't anything to do," Bropha went on, "with the fact of her immense personal attractiveness. After all, that's an almost uniform quality of her race! I've sometimes thought that racial quality of the Daya-Bals might be strong enough to have diverted our sufficiently confused standards of such abstractions as beauty and perfection into entirely new channels—if their people hap-

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pened to be spread out among our A-Class civilizations."

The Co-ordinator laughed. "It just might be, at that! Perhaps it's fortunate for us they've lost the urges of migrating and dominating the widest possible range of surroundings."

Bropha didn't agree.

"If they hadn't lost them," he said, "they'd be something other than they are—probably something a good deal less formidable. As it is, they've concentrated on themselves. I've heard them described as metaphysicists and artists. But those are our terms. Personally I think the Daya-Bals understand such terms in a way we don't. While I was living among them, anyway, I had a constant suspicion that they moved habitually in dimensions of mental reality I didn't know of as yet—"

He stopped and hauled himself back.

"You were going to speak of Zamm," his friend reminded him.

"Well, in a way I *am* speaking of her!" Bropha said slowly. "Obviously, the mere fact that a Daya-Bal is working for you, for the Department of Galactic Zones—and operating one of those really hellish robot ships of yours—is a flat contradiction to everything we know about them. Or think we know! A fallen angel would seem much less of a paradox. And there was the manner in which she

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killed Greemshard—"

The Co-ordinator raised a bushy gray eyebrow.

"Naturally," Bropha assured him, "I'm not blaming her for Greemshard's death. Under the circumstances, that had become unavoidable, in any case. But Zamm killed him"—he was selecting his words carefully now—"as if she were under some inescapable compulsion to do it. I don't know how else to describe the action."

He waited, but Zamm's boss offered no comment.

"There were two other incidents," Bropha continued, "on our way back here. The first was on the same day that we took off from that chunk of ice of a moon. We chased something. I didn't see what it was and I didn't ask her. There was a little maneuvering and a fairly long, straight run, about two minutes. We got hit by something heavy enough to slow us; and then the ship's automatics went off. That was all. Whatever it was, it was finished."

"It was finished, all right!" the Co-ordinator stated. "That was a Shaggar ship. They seem to be migrating through that section. Zamm reported the incident, and as I was following your return with interest, I heard of it directly."

"I'm not questioning the ethics of your Agents' work, you know," Bropha said after a pause. "Having seen something of what the Shaggar will do to anybody who can't outfight them, I also realize that killing them, in particular, is in a class with destroying a plague virus. No, the point is simply that I saw Zamm's face immediately afterwards. She came past my cabin and looked in at me for a moment. I don't believe she actually saw me! Her eyes looked blind. And her face had no more expression than a white stone—"

He added doubtfully, "And that's not right either! Because at the same time I had the very clear impression that she was staring past me at something. I remember thinking that she hated whatever she saw there with an intensity no sane being should feel against anything." He paused again. "You know now what I'm trying to say?"

"It's fairly obvious," the Co-ordinator replied judicially, "that you believe one of my Agents, at least, is a maniac."

"It sounds thoroughly ungrateful of me," Bropha nodded, "but that's about it—except, of course, that I don't actually believe it! However, for the sake of my own peace of mind, I'd be obliged if you'd take the trouble to look up the facts on Zone Agent Zamm and let me know what the correct explanation is."

It was the Co-ordinator who hesitated now.

"She's a killer, certainly," he said at last. He smiled faintly. "In fact, Bropha, you've been granted the distinction of being rescued by what is quite probably the grand champion killer of the department. Zamm's a Peripheral Agent — roving commis-

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sion you might call it. No fixed zone of operations. When she runs out of work, she calls in to Central and has them lay out a pattern of whatever foci of disturbance there are in the areas she's headed for. She checks in here at Jeltad about once a year to have her ship equipped with any worthwhile innovations Lab's cooked up in the interval."

He reflected a moment. "I don't know," he said, "whether you were in a condition to notice much about that ship of hers?"

"Not much," Bropha admitted. "I remember, when she called it back to pick us up, it seemed bulkier than most Agent ships I'd seen—a big, dull-black spheroid mostly. I saw very little of its interior. Why?"

"As an Agent ship, it's our ultimate development in self-containment," the Co-ordinator said. "In that particular type, camouflage and inconspicuousness are largely sacrificed to other advantages. Self-repair's one of them; it could very nearly duplicate itself in case of need. Those are the peripheral ships—almost perpetual travelers. The Agents who direct them prowl along the fringes of our civilizations and deal with whatever needs to be dealt with there before it gets close enough to cause serious trouble."

"I understand the need for such Agents," Bropha said slowly. "I should think, however, that they would be selected for such work with particular care."

"They are," said the Co-ordinator.

"Then supposing," said Bropha, "that another people, like the Daya-Bals—who are experts in other branches of robotics—came into possession of such a ship. They could duplicate it eventually?"

"After some fifty years of study, they could," the Co-ordinator agreed. "It wouldn't worry us much since we expect to be studying hard ourselves throughout any given fifty years of history. Actually, of course, we have a theory that our Agents are psychologically incapable of giving away departmental secrets in a manner that could cause us harm."

"I know," said Bropha, "that's why I was surprised to discover that there are . . . or were . . . two other Daya-Bals on Zamm's ship."

For the first time, the Co-ordinator looked a little startled.

"What made you think so?"

"I heard them talking," Bropha said, "on various occasions, though I didn't make out what they said. And finally I saw them—they came past my door, following Zamm." He paused. "I was under drugs at the time," he admitted, "and under treatment generally. But I can assure you that those incidents were not hallucinations."

"I didn't think they were," said the Co-ordinator. "Is that why you're trying to check on Zamm's motivations?"

Bropha hesitated. "It's one of the reasons."

The Co-ordinator nodded. "Fifteen years ago, Zamm lost her husband and child in a space attack on a

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Daya-Bal liner. There were three survivors—Zamm was one—but they'd been unconscious through most of the action and could give no description of the attackers. The bodies of most of the other passengers and of the crew were identified, but about fifty remained unaccounted for. Zamm's husband and child were among that number. She believes they were taken along alive by the unknown beings that wrecked and looted the ship."

"That's not so unreasonable!" Bropha said. But he looked rather shaken, suddenly.

"No," agreed the Co-ordinator. "Under the circumstances, though, it's extremely unreasonable of her to expect to find them again. You might say that Zamm is under a delusion in that she believes she will be able to beat probability at such outrageous odds. But that's the extent of her 'insanity'—according to our psychologists."

Bropha started to speak, but then shook his head.

"So it's not too hard to understand that Zamm hates the things she hunts," the Co-ordinator pointed out. "In her eyes, they must be much the same as the things that took her family from her—they might even, by coincidence, be those very things themselves!"

"But that doesn't—" Bropha began again.

"And her delusion appears to have blinded her neither to the difficulties of the task nor to the methods most likely to overcome them," the Co-ordinator continued blandly. "A few years after her loss, she reduced the odds against her at one stroke to the lowest practical level by coming to work for us. In effect, that put the Department of Galactic Zones permanently on the job of helping her in her search! For the past dozen years, any trace of a Daya-Bal any of our operatives has discovered outside of the Betelgeuse Zone has been reported to Zamm in a matter of hours. Now, those two you saw on her ship—can you describe them?"

"It was dark in the passage," Bropha said hesitantly. He was a little pale now. "However, I couldn't be mistaken! It was a man and a boy."

The Co-ordinator was silent for a moment.

"I thought it would be that," he admitted. "Well, it's an unpleasant notion to our way of thinking, I grant you—even a somewhat nightmarish one. There's a flavor of necromancy. However, you can see it's obviously not a matter that involves any question of Zamm's loyalty. As you say, the Daya-Bals are very clever in robotics. And she was a neurosurgeon before she came to us. Those were just two marionettes, Bropha!"

He stood up. "Shall we rejoin your party, now?"

Bropha had come to his feet, too. "And you still say she isn't insane?" he cried.

The Co-ordinator spread his hands. "So far as I can see, your experience offers no contradictory

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proof! So I shall simply continue to rely on the department's psychologists. You know their verdict: that whatever our Agents may do, their judgment will be almost as nearly infallible as it is possible for highly-trained human-type intelligences to become. And, further, that no matter how widely their motivations may vary, they will not vary even to the extent of being unacceptable to the department."

III.

Three days out in space by now, Zone Agent Zamm was rapidly approaching the point at which she had first swerved aside to join the search for Bropha.

She was traveling fast—a great deal faster than she had done while taking her damaged and politically valuable passenger home. With him on board she'd felt obliged to loiter, since the department did not recommend top velocities when some immediate emergency wasn't impending. Only vessels of the truly titanic bulk of Vega's Giant Rangers could navigate with apparent safety at such speeds; while to smaller ships things were likely to happen—resulting usually in sudden and traceless disappearances which had been the subject of much unsatisfactory theorizing in Department Lab and similar scientific centers throughout civilization. But Zamm was impatient both of the numbing, senseless vastness of space and of its less open dangers. Let it snap at her from ambush if it liked! It always missed.

"Want a hot-spot chart on this line I'm following, for a week's cruising range," she informed the ship's telepath transmitter; and her request was repeated promptly in Galactic Zones Central on the now faraway planet of Jeltad.

Almost as promptly, a three-dimensional star-map swam into view on the transmitter-screen before Zamm. She studied it thoughtfully.

The green dot in the center indicated her position. Visually, it coincided with the fringe of a group of short crimson dashes denoting the estimated present position of the migrating Shaggar ships she had contacted briefly and reported on her run to Jeltad. A cloud of white light far ahead was a civilized star cluster. Here and there within that cluster, and scattered also around the periphery of the chart, some dozens of near-microscopic sun-systems stood circled in lines of deep red. Inclosing the red circles appeared others: orange, purple, green—indicating the more specific nature of the emergency.

Zamm stabbed a pointer at three systems marked thus as focal points of trouble inviting a Zone Agent's attention, near the far left of the chart.

"Going to try to pick up the Shaggar drift again," she announced. "If we find it, we ought to be somewhere up in that area before we're done with them. Get me the particulars on what's wrong around there, and home it out to me. That's all—"

She switched off the transmitter.

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The star map vanished and a soft, clear light filled the room. Zamm rubbed a thin, long hand over her forearm and blinked pale eyes at the light. "How about a snack?" she asked.

A food tray slid out of the wall to a side table of the big desk, its containers variously iced or steaming.

She ate slowly and lightly, mentally organizing the period of time ahead. Only for a few weeks—once she had laid out plans for a year or more—so and so many planets to investigate—such and such a field to cover! But the hugeness of the task had gradually overwhelmed her will to major planning. Now she moved about in briefer spurts, not aimlessly but diverted toward new areas constantly by hunches, sudden impulses and hopes—careful only not to retrace her tracks any more than could be avoided.

But she was beaten, she knew. She'd never find them! Neither would any of the thousands and thousands of people she'd set watching and looking for traces of them. The Universe that had taken them was the winner.

She glanced over at the black, cold face that filled the whole of her ship's vision tank, its million glittering eyes mocking her.

"Stupid thing—grinning!" she whispered, hating it tiredly. She got up and started moving restlessly about the big room.

Black Face out there was her enemy! She could hurt it a little, but not much. Not enough to count. It was so big it only had to wait. For centuries; for thousands, for tens of thousands and hundred of thousands of years. Waiting while life built up somewhere, warm and brave and frail and hopeful—then it came suddenly with its flow of cold foulness to end it again! With some ravaging, savage destruction from outside, like the Shaggar; or more subtly with a dark pulse that slowly poisoned the mind of a race. Or it might be even only a single intelligent brain in which the cold death-pattern grew till it burst out suddenly to engulf a nation, a planet— There was simply no end to the number and kinds of weapons the Universe had against life!

Zamm had stopped her pacing. She stood looking down at a big couch in the center of the room.

"You shouldn't try mind-search now, Zamm!" The voice of the gigantic robot that was the ship came, almost anxiously, into the room. "You've been under severe emotional tensions throughout the past weeks!"

"I know," she murmured. "Glad they got him back though—nice people; nice guy! We worried him, I think—" She kicked the side of the couch reflectively with the tip of one soft boot. "Those tensions might help, you know! Send the doll out and we'll see."

"The big one?" the voice inquired.

"No!" said Zamm with a sort of terror. "Can't stand to look at him when I'm all alone. No, the little one—"

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Somewhere in the ship a door opened and closed. After a few seconds, footsteps came running, lightly, swiftly. A small shape scampered into the room, stopped, glanced about with bright sharp eyes, saw Zamm and ran to her.

She opened her arms and swept up the shape as it flung itself at her laughing.

"What an artist made those masks!" she said wonderingly, her fingertips tracing over a cheek of the face that was very like her own and yet different. "You couldn't tell by just touching—!" She smiled down at the shape cradled in her arms. "Fifteen years! Be a bigger boy now—but not too much. We don't shoot up quick like those old A-Class humans, do we? But for that, we grow up smarter. Don't we?"

The shape chuckled amiable agreement. Zamm blinked at it, half-smiling but alert, as if listening to something within herself. The dolls had very little in common with her working robots; they were designed to be visual hypnotics, compelling and dangerous agents that could permanently distort the fabric of sanity. Those of her people who had helped her in their design had done it reluctantly, though they understood the value of such devices for one who went searching in memory for what she had lost in time. With almost clinical detachment, she watched herself being drawn under the familiar compulsion that seemed to combine past and present, illusion and reality, until something stormy and cold washed suddenly through her face, slackening its features. Then she closed her eyes for a moment, and set the shape carefully back on its feet on the floor.

"Run along, little boy!" she told it absently, her face taut and blank once more. "Back to your place! Mother's busy."

Its gurgle of laughter merged into a receding rush of footsteps. Presently a door clicked shut again, somewhere.

Zamm went slowly to the couch and lay down on it, flat on her back, arms over her head.

"We'll try mind-search now!" she said.

The robot made no comment. A half-score glassy tentacles came out from under the couch and began to fasten themselves here and there over Zamm's body, coiled about her skull and glued flaring tips to her temples.

"I'm set," she said. "Let it go!"

A faint humming rose from the wall. Her body stiffened suddenly, went rigid, and then relaxed completely.

There had been a brief awareness of cold, rushing inwards from all sides. But almost instantly, it reached and chilled the nerve-linkages at which it was directed.

Incoming sensation ceased with that, abruptly. Zamm's brain swam alone, released, its consciousness diffused momentarily over an infinity of the what-had-been, the time-past—but also over deceptively similar

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infinities of the might-have-been, the never-was. Those swirling universes of events and symbols would crystallize now, obediently but not necessarily truthfully, into whatever pattern consciousness chose to impress on them.

The brain could fool itself there! But it had an ally who wouldn't be tricked.

It ordered:

"Back to just before it began!"

Swarm after swarm of neurons woke suddenly to the spreading advance of the robot's stimulating, probing forces through their pathways. Million-factored time-past events formed briefly, were discarded and combined anew. At last, familiar images began to flick up and reel away within the brain. Remembered sound crashed; remembered warmth swept in—pain, cold, touch, rest.

Hate, love, terror — possession, loss.

"We're there! Where it began."

There was the darkened cabin on the doomed spaceliner, only a small pool of amber light glowed against one tapestried wall. Distant and faint came the quivering of gigantic engines.

"They hadn't quite worked the shake out of them, those days," Zamm's brain remembered.

She lay on the cabin's big bed, lazing, content, half asleep on her side, blinking at the amber glow. She'd been first to take note of the rest period's arrival and come back to the cabin. As usual.

". . . used to love to sleep, those days!"

Her menfolk were still playing around somewhere in the vacation ship's variously and beautifully equipped playrooms. The big one and the little one—should be getting more rest, both of them! What's a vacation for, otherwise?

Zamm was beginning to wonder idly just where they'd gone to loiter this time, when the amber light flickered twice—

"It's begun!"

Roar of sound, flash of light! Then the blaring attack-alarm from the cabin's communicator was cut short; and a body went flip-flopping crazily about the room like an experimental animal speared by an electric current. Everywhere, the liner's injured artificial gravs were breaking circuits, reforming instantly, breaking at other points; and reforming again. And holding at last, locked into a new, emergency-created pattern.

But in the cabin was darkness and unconsciousness, while over the fifteen years, for the two-thousandth time, Zamm's brain strained and tore for the one look out, the one identifiable sound—perhaps even a touch. A fraction of a second might be all she'd need!

And it had lasted two hours, that period! For two hours, *they* swarmed about the ship they had murdered, looting, despoiling, dragging away the ones still alive and not too badly hurt. They must have come

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into the cabin more than once, prowled about it, stared at her, touched her. Gone on—

But—nothing.

Full consciousness emerged suddenly at the same point as always. Then the body went crawling and scrambling up the tilted flat of a floor, tilted irrevocably now in the new gravitational pattern the stricken liner had achieved for its rigor mortis. Broken bone in lower right arm, right ankle flapping loosely—like the splintered cabin door overhead, that flapped from what was now one edge of a tilted ceiling! From somewhere within the ship came the steady roar of atomic fires; and then sudden sounds like the yelping of animals, rising into long shrieks.

"The ray-burned ones!" gasped Zamm, as the clambering body stiffened in horror, unmoving, listening. "But those weren't mine!" she screamed. "I checked them all!" She caught herself. "Wait—I'll have to go through that period again."

"You can't do that twice!" the robot's voice said. "Not now. Not that part!"

"Well—" It was right, of course. It usually was. "Get on with the sequence then!"

"Even that's too dangerous. You're nearly exhausted, Zamm!"

But the body reached for the edge of the door, hung on with the good arm, with the bad one, kicked with both legs and wriggled over awkwardly into a bright-lit corridor, slanted upward at a nightmarish

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angle. Other bodies lay there, in tumbled piles, not moving.

"If I hadn't stopped to check those — If I'd looked up sooner—just a few seconds sooner!"

One by one, the lost seconds passed away as always, and then the body suddenly looked up. A bright glare filled the upper end of the tilted corridor. Something had moved within that glare of light—had just crossed the corridor and was disappearing again down another hallway that angled off it, slanting downwards. The light followed the moving shape like a personal shadow and vanished behind it.

"Working in individual light-barriers, making a last check before they left," murmured Zamm, while the body crawled and hobbled toward the point where the light had been, screaming with terror, rage, question and despair.

"If I'd looked up that moment sooner, I'd have seen what they were like, even in space armor—human or what. I'd have *seen!*"

She found herself staring up at the ceiling of her ship's control room, muttering the worn old words.

She stirred stiffly but made no attempt to sit up.

"Nearly went out here," she said tonelessly.

"That was dangerous, Zamm," said the robot-voice. "I warned you."

"No harm done!" she said. "Next time, we'll just work the unconscious period through all by itself."

She lay quiet, her mouth bitter. Somewhere in memory, as somewhere in space, were points where she might pick up their trail. Things she had experienced in those hours but not consciously remembered. Scattered groups of cells within the bony box that inclosed her brain still held them locked.

Statistically, it couldn't happen that she would ever flood any specific group of cells with the impulse-pattern that revived those specific flickers of memory. Statistically, it would be a whole lot easier even to pick the one sun-system and planet where they might be out of the numberless fiery cells that were the galaxy's body!

But she was still learning! One way or the other, she was going to do it. Find them—

Zamm lay there, staring upwards, bitter and unbelieving.

"What is it?" she asked suddenly.

"Company!" the robot said.

They were a long, long distance away, moving at many times the speed of light. In the vision tank, they seemed to glide past unhurriedly almost within shouting range of the ship. One, two, three, four—

Four clouds of diffused radiance, like great, luminous jellyfish pulsing down an indetectable current of space. Migrating Shaggar ships behind their camouflaging screens. They had spotted her, of course, but like most of the older forms of space life they had learned to be careful about strange ships that did not flee from them at once. They were waiting to see her next move.

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"Confirm position and direction of the drift for Central first!" Zamm said. Despair and rage were still bleak in her eyes, but her long, tapered fingers slid swiftly and surely above and about the armament banks of the control desk. Not touching anything just yet; only checking.

"Two of these are nearly in line," the robot reported.

"Five in all!" sniffed Zamm. "One more could make it a fight. Parallel course, and swing round once to make them bunch up—"

A minute or so later, they flashed across the Shaggars' path, at point-blank range ahead of them. The nebular screens vanished suddenly, and five deep-bellied, dark ships became visible instead. Light and energy boiled abruptly all about Zamm's black globe—before, behind. It missed.

"Spot any more, this side?"

"Four more are approaching—barely detectable! They may have been called by this group."

"Good enough! We'll take them next." Zamm waited as the ship completed its swing and drove into line behind her quarry. They were beyond any weapon-reach by then, but space far ahead was being churned into a long whirlpool of flame. At the whirlpool's core, the five Shaggar ships, retreating at speed, had drawn close together and were throwing back everything they had.

"Instructions?" the robot-voice murmured.

"Contact range— Move in!"

Up the long cone of flame, the ship sprang at the five. Zamm's hands soared, spread and high, above the armament banks—thin, curved, white claws of hate! Those seeming to swim down toward her now, turning and shifting slowly within their fire-veils, were not the faceless, more or less humanlike ones she sought. But they were marked with the same red brand: brand of the butchers, looters, despoilers—of all the death-thoughts drifting and writhing through the great stupid carnivore mind of the Universe—

At point-blank range, a spectral brilliance clung and hammered at her ship and fell away. At half-range, the ship shuddered and slowed like a beast plowing through a mudhole and out. At one-quarter, space turned to solid, jarring fire for seconds at a time.

Zamm's hands flashed.

"NOW—"

A power ravened ahead of them then like the bellowing of a sun. Behind it, hardly slower, all defenses cut and every weapon blaring its specific ultimate of destruction, the ship came screaming the hate of Zamm.

IV.

Two years—

The king-shark was bothering Zamm! It hung around some subspace usually where she couldn't hope to trace it.

It was a big ship, fast and smart and tricky. It had weapons and powers of which she knew nothing. She couldn't even guess whether it real-

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ized she was on its tail or not. Probably, it didn't.

Its field of operations was wide enough so that its regularly spaced schedule of kills didn't actually disrupt traffic there or scare it away. A certain percentage of losses had to be taken for granted in interstellar commerce. The chief difference seemed to be that in this area the losses all went to the king-shark.

Zamm circled after it, trying to calculate its next points of appearance. A dozen times she didn't miss it by much; but its gutted kills were still all she got.

It took no avoidable chances. It picked its prey and came boiling up into space beside it—or among it, if it was a small convoy—and did its work. It didn't bother with prisoners, so the work was soon done. In an hour everything was over. The dead hulks with their dead crews and dead passengers went drifting away for Zamm to find. The king-shark was gone again.

Disgusted, Zamm gave up trying to outguess it. She went off instead and bought herself a freighter.

The one she selected was an expensive, handsome ship, and she loaded it up with a fortune. She wanted no gilded hook for the king-shark; she'd feed it solid gold! There were a dozen fortunes lying around her globe, in salvaged cash and whatnot from previous jobs. She'd use it up as she needed it or else drop it off at Jeltad the next time she went back. Nobody kept accounts on that sort of stuff.

Her freighter was all ready to start.

"Now I need a nice pirate!" mused Zamm.

She went out and caught herself one. It had an eighteen-man crew, and that was just right for the freighter. She checked over their memories first, looking for the one thing she wanted. It wasn't there. A lot of other things were, but it had been a long time since that kind of investigation made her feel particularly sick.

"Anyone lives through it, I'll let him go!" she promised, cold-eyed. She would, and they knew it. They were small fry; let somebody else grab them up if they wanted them badly enough!

At a good, fast, nervous pace, the freighter and its crew crossed what was currently the most promising section of the king-shark's area—Zamm's black globe sliding and shifting and dancing about its bait at the farthest possible range that would still permit it to pounce.

By and by, the freighter came back on another route and passed through the area again. It was nearing the end of the fourth pass when the king-shark surfaced into space beside it and struck. In that instant, the freighter's crew died; and Zamm pounced.

It wasn't just contact range; it was contact. Alloy hide to alloy hide, Zamm's round black leech clung to the king-shark's flank, their protective screens fused into a single useless mass about them. It didn't matter at what point the leech started to bite;

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there weren't any weak ones. Nor were there any strong enough to stop its cutter-beam at a four-foot range.

It was only a question of whether they could bring up something in eighty seconds that would blast out the leech's guts as the wall between them vanished.

They couldn't, it seemed. Zamm and her goblin crew of robots went into the king-shark in a glittering wave.

"Just mess up their gravs!" said Zamm. "They don't carry prisoners. There'll be some in suits, but we'll handle them."

In messed-up rows, the robots laid out the living and the nearly-dead about the king-shark's passages and rooms.

"From Cushgar!" said Zamm surprised. "They're prowling a long way from home!"

She knew them by their looks. The ancestors of the king-shark's one hundred and fourteen crewmen had also once breathed the air of Terra. They had gone off elsewhere and mutated variously then; and, like the Daya-Bals, the strongest surviving mutant strains eventually had blended and grown again to be a new race.

Not a handsome one, by Zamm's standards! Short and squat and hairy, and enormously muscled. The spines of their neck and back vertebrae stuck out through their skins in horny spikes, like the ridge on a turtle's shell. But she'd seen worse-looking in the human line; and she wasn't judging a beauty contest.

A robot stalked briskly along the rows like a hunting wasp, pausing to plunge a fine needle into the neck of each of the people from Cushgar, just beneath the fourth vertebral spike. Zamm and a robot that had loafed till now picked out the ones that seemed damaged worst, settled down beside each in turn and began their questioning.

Some time passed—four, five hours—finally six. Then Zamm and her robots came back to her ship. The leech sealed its egress port, unclamped and took off. The king-shark's huge, dark hulk went drifting along through space. There was no one alive on it now. Fifteen minutes later, a light suddenly flared from it, and it vanished.

Zamm sat white-faced and silent at her desk for a much longer time than that.

"The dolls," she said finally, aloud.

"Yes?" said the big robot-voice.

"Destroy them," said Zamm. She reached out and switched on the telepath transmitter. "And get me a line through to Jeltad. The Co-ordinator—"

There was no reply, and no sound came from within the ship. She lit up some star-globes and began calculating from them. The calculations didn't take long. Then she sat still again for a while, staring into the luminous green, slowly swirling haze that filled the transmitter screen.

A shape and a face began forming

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in it at last; and a voice pronounced her name questioningly.

"They're in Cushgar!" said Zamm, the words running out in a brittle, tinkling rush. "I know the planet and the place. I saw them the way *it* saw them—the boy's getting pretty big. It's a gray house at a sort of big hospital. Seventeen years they've been working there! Seventeen years, working for them!" Her face was grisly with hate.

The Co-ordinator waited till the words had all run out. He looked rather sick.

"You can't go there alone!" he said.

"How else?" Zamm said surprised. "Who'd be going with me there? But I've got to take the ship. I wanted to tell you."

The Co-ordinator shook his head.

"You bought the ship with your second mission! But you can't go there alone, Zamm. You'll be passing near enough to Jeltad on your way there, anyway. Stop in, and we'll think of something!"

"You can't help me," Zamm told him bluntly. "You can't mission anybody into Cushgar. You lost every Agent you ever sent there. You try a Fleet squadron, and it's war. Thousand Nations would jump you the day after!"

"There's always another way," the Co-ordinator said. He paused a moment, looking for that other way. "You stay near your transmitter anyhow! I'll call you as soon as we can arrange some reasonable method—"

"No," said Zamm. "I can't take any more calls either—I just got off a long run. I'm hitting Deep Rest now till we make the first hostile contact. I've only got one try, and I've got to give it everything. There's no other way," she added, "and there aren't any reasonable methods. I thought it all out. But thanks for the ship!"

The Co-ordinator located a man called Snoops over a headquarters' communicator and spoke to him briefly.

Snoops swore softly.

"She's got other friends who would want to be told," the Co-ordinator concluded. "I'm leaving that to you."

"You would," said Snoops. "You going to be in your offices? I might need some authority!"

"You don't need authority," the Co-ordinator said, "and I just started on a fishing trip. I've had a vacation coming these last eight years—I'm going to take it."

Snoops scowled unpleasantly at the dead communicator. He was a shriveled little old man who had no official position in the department. He had a long suite of offices and a laboratory, however. His business was to know everything about everybody, as he usually did.

He scratched his bearded chin and gave the communicator's tabs a few vindictive punches. It clicked back questioningly.

"Want a location check on forty-two thousand and a couple of hundred

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names!" Snoops said. "Get busy!"

The communicator groaned.

Snoops ignored it. He was stabbing at a telepath transmitter.

"Hi, Ferd!" he said presently.

"Almighty sakes, Snoops," said Ferdinand the Finger. "Don't unload anything new on me now! I'm right in the middle—"

"Zamm's found out about her kin," said Snoops. "They're in Cushgar! She's gone after them."

Zone Agent Ferdinand swore. His lean, nervous fingers worked at the knot of a huge scarlet butterfly cravat. He was a race tout at the moment—a remarkably good one.

"Where'd she contact from?" he inquired.

Snoops told him.

"That's right on my doorstep," said Ferdinand.

"So I called you first," Snoops said. "But you can't contact her. She's traveling Deep Rest."

"Is, huh? What's Bent say?" asked Ferdinand.

"Bent isn't talking—he went fishing. Hold on there!" Snoops added hastily. "I wasn't done!"

"Thanks a lot for calling, Snoops," Ferdinand said with his hand on the transmitter switch. "But I'm right in the middle—"

"You're in the middle of the Agent-list of that cluster," Snoops informed him. "I just unloaded it on you!"

"That'll take me hours!" Ferdinand howled. "You can't—"

"Just parcel it out," Snoops said coldly. "You're the executive type, aren't you? You can do it while you're traveling. I'm busy!"

He cut off Ferdinand the Finger.

"How you coming?" he asked the communicator.

"That's going to be over eighteen thousand to locate!" the communicator grumbled.

"Locate 'em," said Snoops. He was punching the transmitter again. When you wanted to get in touch with even just the key-group of the Third Department's forty-two thousand and some Zone Agents, you had to keep on punching!

"Hi, Senator!"

If anyone was amusing himself that week by collecting reports of extraordinary events, with the emphasis on mysterious disappearances, he ran into a richer harvest than usual.

It caused a quite exceptional stir, of course, when Senator Thartwith excused himself in the middle of a press interview, stepped into the next office to take an urgent personal call, and failed to reappear. For the senator was a prominent public figure—the Leader of the Opposition in the Thousand Nations. He had closed the door behind him; but his celebrated sonorous voice was heard raised in apparent expostulation for about a minute thereafter. Then all became still.

Half an hour passed before an investigation was risked. It disclosed, by and by, that the senator had quite vanished!

He stayed vanished for a remark-

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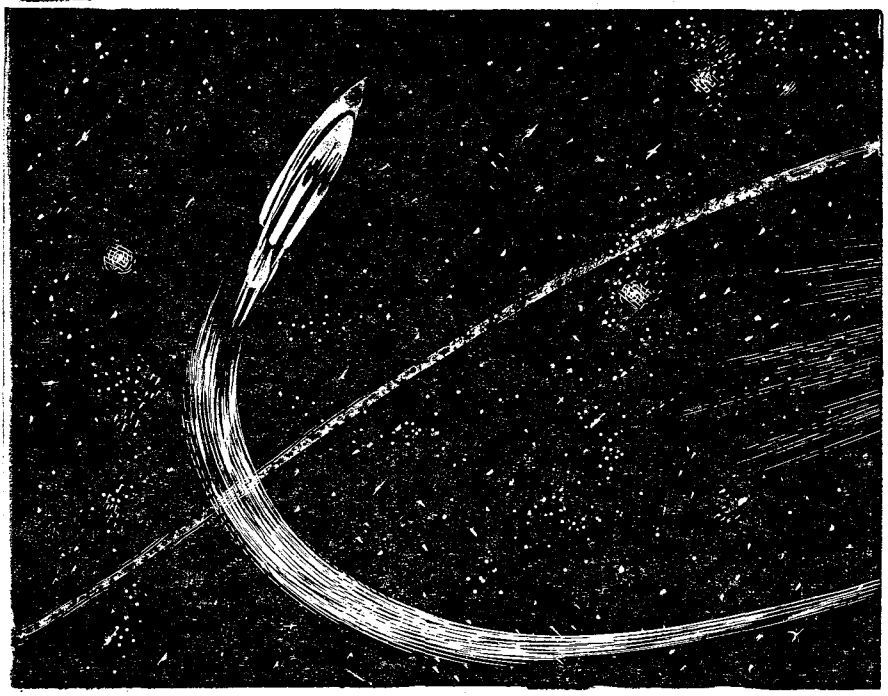

able length of time. In a welter of dark suspicions, the Thousand Nations edged close to civil war.

Of only planetary interest, though far more spectacular, was the sudden ascension of the Goddess Loppos of Amuth in her chariot drawn by two mystical beasts, just as the conclusion of the Annual Temple Ceremony of Amuth began. A few moments before the event, the Goddess was noted to frown, and her lips appeared to move in a series of brisk, celestial imprecations. Then the chariot shot upwards; and a terrible flash of light was observed in the sky a short while later. Amuth bestrewed its head with ashes and mourned for a month until Loppos reappeared.

Mostly, however, these freakish occurrences involved personalities of no importance and so caused no more than a splash of local disturbance. As when Grandma Wannattel quietly unhitched the rhinocerine pony from her patent-medicine trailer and gave the huge but patient animal to little Grimp to tend—"Until I come back." Nothing would have been made of that incident at all—police and people were always bothering poor Grandma Wannattel and making her move on—if Grimp had not glanced back, just as he got home with the pony, and

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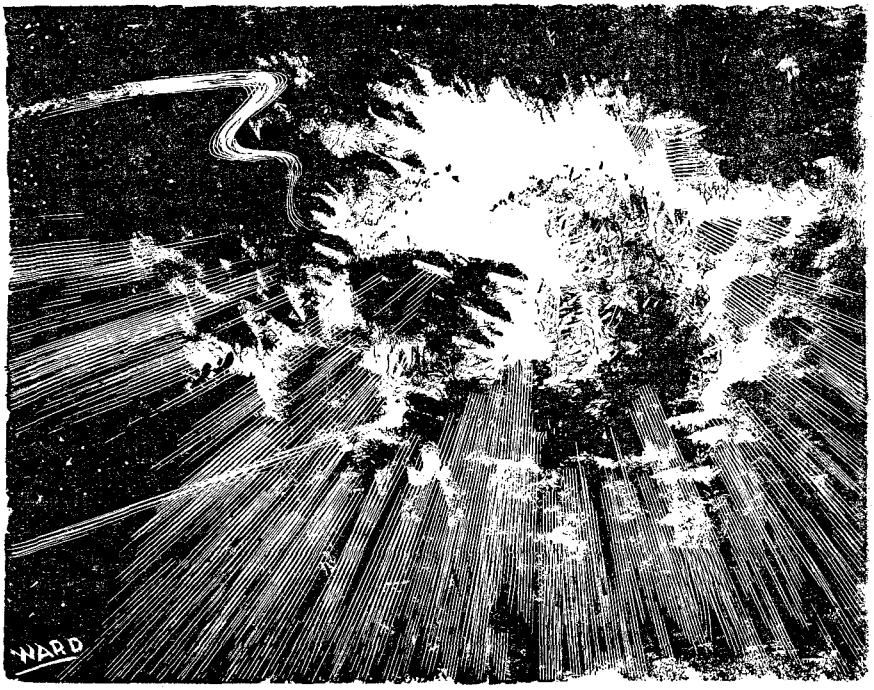

observed Grandma's big trailer soaring quietly over a hillside and on into the sunset. Little Grimp caught it good for that whopper!

In fact, remarkable as the reports might have seemed to a student of such matters, the visible flow of history was at all affected by only one of them. That was the unfortunate case of Dreem, dread Tyrant of the twenty-two Heebelant Systems:

". . . and me all set to be assassinated by the Freedom Party three nights from now!" roared Dreem. "Take two years to needle the chicken-livered bunch up to it again!"

"Suit yourself, chum!" murmured the transmitter above his bed.

"That I will," the despot grumbled, groping about for his slippers. "You just bet your life I will!"

V.

"We should be coming within instrument-detection of the van of the ghost-fleet almost immediately!" the adjutant of the Metag of Cushgar reported.

"Don't use that term again!" the potentate said coldly. "It's had a very bad effect on morale. If I find it in another official communication, there'll be a few heads lifted from their neck-

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spines. Call them 'the invaders.'"

The adjutant muttered apologies.

"How many invaders are now estimated in that first group?" the Metag inquired.

"Just a few thousand, sir," the adjutant said. "The reports, of course, remain very—vague! The main body seems to be still about twelve light-years behind. The latest reports indicate approximately thirty thousand there."

The Metag grunted. "We should be just able to intercept that main bunch with the *Glant* then!" he said. "If they keep to their course, that is. It's high time to end this farce!"

"They don't appear to have swerved from their course to avoid interception yet," the adjutant ventured.

"They haven't met the *Glant* yet, either!" the Metag returned grinning.

He was looking forward to that meeting. His flagship, *Glant,* the spindle-shaped giant-monitor of Cushgar, had blown more than one entire attacking fleet out of space during its eighty years of operation. Its outer defenses weren't to be breached by any known weapon; and its weapons could hash up a planetary system with no particular effort. The *Glant* was invincible.

It was just a trifle slow, though. And these ghost ships, these ridiculous invaders, were moving at an almost incredible pace! He wouldn't be able to get the *Glant* positioned in time to stop the van.

The Metag scowled. If only the reports had been more specific—and less mysteriously terminated! Three times, in the past five days, border fleets had announced they had detected the van of the ghosts and were prepared to intercept. Each time that had been the last announcement received from the fleet in question! Of course, communications *could* become temporarily disrupted, in just that instantaneous, wholesale fashion, by perfectly natural disturbances—but three times!

A slightly chilled breeze tickled the Metag's back-spines for a moment. There was no nonsense about the Metag; but just the same, his conscience—like that of Cushgar generally—was riddled enough to be conducive to occasional superstitious chills.

"There they are, sir!" the adjutant announced suddenly, in an excited quaver.

The Metag stared unbelievingly.

It was as bad as the worst of the reports. It was worse! Secure behind the *Glant's* defenses, the sight of a few thousand hostile cruisers wouldn't have caused him a qualm—

But this!

There *were* a few small war vessels among them—none over six hundred feet long. But, so far as one could tell from their seared, beam-blasted exteriors, most of them had been freighters of every possible size, type

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and description. There was a sprinkling of dainty, badly slashed yachts and other personal space craft. No wonder they'd been mistaken for the murdered cold hulks of the centuries, swept along in a current of awful new life—!

But the worst of it was that, mixed up with that stream, was stuff which simply didn't belong in space—it should have been gliding sedately over the surface of some planetary sea! Some, by Old Webolt, had *wings!*

And that one, there!

"It's a *house!*" the Metag howled, in horrified recognition. "A thundering, Old-Webolt-damned HOUSE!"

House and all, the battered ghost-horde came flashing up at a pace that couldn't have been matched by Cushgar's newest destroyers. Ponderously and enormously, the *Glant* raced forward in what was, even now, an obviously futile attempt to meet them.

The adjutant was gabbling at his side.

"Sir, we may just be able to reach their flank with the grapnels before they're past!"

"Get them out!" the Metag roared. "Full range! Get them out! We've got to stop one of them—find out! It's a masquerade—"

They didn't quite make it. Near the end of the van, a torpedo-shaped, blackened *thing* seemed to be touched for a moment by a grapnel beam's tip. It was whirled about in a monstrous semicircle, then darted off at a tangent and shot away after the others. They vanished in the direction of Cushgar's heart-cluster.

"*That* was a mistake!" breathed the Metag. "It'll be telling them about us. If the main body deflects its course, we'll never . . . no, wait! There's one more coming—stop it! NOW!"

A slender, three-hundred-foot space yacht flashed headlong into a cluster of the *Glant's* grapnels and freezers and stopped dead.

"And *now!*" The Metag passed a broad tongue over his trembling lips. "*Now* we'll find out! Bring them in!"

Grapnels and tractors began to maneuver the little yacht in carefully through the intricate maze of passages between the *Glant's* overlapping first, second, and third defense zones. There was nothing wrong with this ghost's looks; it gleamed blue and silver and unblemished in the lights glaring upon it from a hundred different directions. It might have taken off ten minutes before on its maiden flight.

The Great Squid of space had caught itself a shining minnow.

"Sir," the adjutant said uneasily, "mightn't it be better to beam it first?"

The Metag stared at him.

"And kill whoever's inside before we've talked to them?" he inquired carefully. "Have you gone mad? Does that look like a battleship to you—or do you think they *are* ghosts? It's the wildest good luck we caught them. If it hadn't come straight at us,

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as if it wanted to be caught—"

He paused a moment, scowling out through the screens at the yacht which now hung in a bundle of guide beams just above the *Glant's* yawning intake-port. The minnow was about to be swallowed.

"As if it *wanted* to be caught?" he repeated doubtfully.

It was the last doubt he had.

The little yacht moved.

It moved out of the grapnels and tractors and freezers as if there weren't any! It slid over the monitor's spindle length inside its defenses like a horrible caress. Behind it, the *Glant's* multiple walls folded back in a white-hot, thick-lipped wound. The *Glant* split down its length like a giant clam, opened out and spilled its flaming, exploding guts into space.

The little yacht darted on, unblemished, to resume its outrider position on the ghost-van's flank.

Zone Agent Pagadan of Lar-Sancaya really earned herself a chunk of immortal glory that day! But, unfortunately, no trace of the *Glant* was ever discovered again. And so no one would believe her, though she swore to the truth on a stack of Lar-Sancaya's holiest writings and on seven different lie detectors. Everyone knew what Pagadan could do to a lie detector, and as for the other—

Well, there remained a reasonable doubt.

"What about your contact with the ghosts—the invaders?" Cushgar called to the invincible *Glant*. "Have you stopped them? Destroyed them?"

The *Glant* gave no answer.

Cushgar called the *Glant*. Cushgar called the *Glant*. Cushgar called the *Glant*. Cushgar called the *Glant*—

Cushgar stared, appalled, into its night-sky and listened. Some millions of hostile stars stared back with icy disdain. Not a cry came again from the *Glant*—not a whisper!

The main body of the ghost fleet passed the spot twenty minutes later. It looked hardly damaged at all. In its approximate center was Zone Agent Zamman Tarradang-Pok's black globe, and inside the globe Zamm lay in Deep Rest. Her robot knew its duty—it would arouse her the instant it made hostile contact. It had passed through a third of Cushgar's territory by now, but it hadn't made any as yet.

The main body overtook the eager beavers up front eight hours later and merged with them. Straggled groups came up at intervals from behind and joined. The ghost fleet formed into a single cluster—

A hell-wind blew from the Galaxy's center on Cushgar's heart; and panic rushed before it. The dead were coming: the slaughtered billions, the shattered hulks, the broken defenders—joined now in a monstrous, unstoppable army of judgment that outsped sane thought!

Cushgar panicked—and the good, solid strategy of centuries was lost. Nightmare was plunging at it! Scattered fleet after fleet, ship after ship, it hurled what it could grab up into the path of the ghosts.

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Not a cry, not a whisper, came back from the sacrifices!

Then the remaining fleets refused to move.

Zamm was having a nice dream.

It didn't surprise her particularly. Deep Rest was mostly dreamless; but at some levels it produced remarkably vivid and detailed effects. On more than one occasion they'd even tricked her into thinking they were real!

This time her ship appeared to have docked itself somewhere. The somno-cabin was still darkened, but the rest of it was all lit up. There were a lot of voices.

Zamm zipped up the side of her coverall suit and sat up on the edge of the couch. She listened a moment, and laughed. This one was going to be silly but nice!

"Box cars again!" a woman's voice shouted in the control room as Zamm came down the passage from her cabin. "You crummy, white-whiskered, cheating old—" A round of applause drowned out the last word, or words.

"Lady or no lady," the voice of Senator Thartwith rose in sonorous indignation, "one more such crack and I mow you down!"

The applause went up a few decibels.

"And here's Zamm!" someone yelled.

They were all around her suddenly. Zamm grinned at them, embarrassed. "Glad you found the drinks!" she murmured.

The tall Goddess of Amuth, still flushed from her argument with Zone Agent Thartwith, scooped Zamm up from behind and set her on the edge of a table.

"Where's a glass for Zamm?"

She sipped it slowly, looking them over. There they were, the tricky and tough ones—the assassins and hunters and organizers and spies! The Co-ordinator's space pack, the innermost circle. There he was himself!

"Hi, Bent!" she said, respecting his mission-alias even in a dream. "Hi, Weems! . . . Hi, Ferd!" she nodded around the circle between sips.

Two score of them or more, come into Deep Rest to tell her good-by! She'd bought them all their lives, at one time or another; and they'd bought her hers. But she'd never seen more than three together at any one time in reality. Took a dream to gather them all!

Zamm laughed.

"Nice party!" she smiled. Nice dream. She put down her empty glass.

"That's it!" said the Goddess Loppos. She swung Zamm's feet up on the table, and pulled her around by the shoulders to look at the wall. There was a vision port there, but it was closed.

"What's all this?" Zamm smiled expectantly, lying back in Loppos' arms. What goofy turn would it take now?

The vision port clicked open.

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Harsh daylight streamed in.

The ship seemed to have set itself down in a sort of hot, sandy park. There was a huge gray building in the background. Zamm gazed at the building, the smile going slowly from her lips. A hospital, wasn't it? Where'd she seen—?

Her eyes darted suddenly to the lower left corner of the port. The edge of another building was visible there—a small house it was, also gray and very close. It would be right beside the ship!

Zamm convulsed.

"No!" she screamed. "It's a dream!"

She was being lifted from the table and put on her feet. Her knees wobbled, then stiffened.

"They're feeling fine, Zamm!" the voice of the gray-haired man called Bent was saying. He added: "The boy's got pretty big!"

"She'll be all right now!" somebody else murmured behind her. "Zamm, you know Deep Rest! We couldn't take chances with it. We told them they'd have to wait there in the house till you woke."

The ramp beam set her down on the sand of a path. There was hot daylight around her then—seventeen years behind her, and an open door twenty steps ahead.

Her knees began wobbling again.

Zamm couldn't move.

For a score of scores of light-years about, Cushgar the Mighty lay on its face, howling to its gods to save it from the wrath of the ghosts and the wrath of Zamm.

But she—Zone Agent Zamman Tarradang-Pok, conqueror of space, time, and all the laws of probability—she, Free-mind Unqualified of the Free Daya-Bals—Doctor of Neuronics—Vega's grand champion of the Galaxy:

No, she just couldn't move!

Something *put-putted* suddenly by overhead. Enough of its seared and molten exterior remained to indicate that at some earlier stage of its career it might have been a fat, amiable-looking freighter. But there was nothing amiable about its appearance now! It looked like a wreck that had rolled for a century in the fires of hell, and put in another decade or two sunk deep in an acid sea. It looked, in fact, exactly as a ship might expect to look whose pilot had a weakness for withholding his fire till he was well within point-blank range.

But though it had lost its make-up, the ship was otherwise still in extra-good condition! It passed over Zamm's head, bobbed up and down twice in cheerful greeting, and went *putting* off on its secondaries, across the vast hospital and toward the city beyond, dropping a bit as it went, to encourage Cushgar to howl a little louder.

Zamm gazed blankly after the beat-up, impossible warrior, and heard herself laughing. She took a step—and another step.

Why, sure, she could move!

She was running—

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". . . so that's how it was," the Third Co-ordinator told Bropha. He swirled the contents of his nearly empty glass around gently, raised it and finished his drink. "All we'd really intended was to hold that dead-straight course, and smash their light interception all the way in. That was to make sure they'd bunch every heavy ship they had on that line, to stop us just before we reached the Cluster.

"Then we were going to pop off at an angle, streak for the place they were keeping Zamm's folks, grab them up and get out of Cushgar again—

"But, of course," he added, "when we discovered they'd all rolled over on their back spikes and were waving their hands in the air, we couldn't resist taking over! You just never know what you start when you go off on an impromptu mission like that!"

He paused and frowned, and sighed. For the Third Co-ordinator was a man of method, who liked to see a job well worked out in advance, with all its angles considered and plenty of allowance made for any unforeseeable developments.

"How about a second drink?" Bropha inquired.

"No," said his friend; "I've got to get back to work. They can squawk all they like"—Bropha realized he was referring to his colleagues of the Council—"but there isn't another Department of the Confederacy that's been jammed up by the Cushgar affair as badly as Galactic Zones is right now! That was forty-two thousand two hundred and thirty-eight individual mission-schedules we had to re-plot!" he said, still somewhat aghast at the completeness of the jam. "Only a third of it's done! And afterwards, I'll have time to worry about finding a replacement for Zamm. There's nothing so scarce as a really good Peripheral Agent! That's all *I* got out of it—"

Bropha looked sympathetic.

"I talked to that boy, and I've got some hopes for him," the Co-ordinator added glumly. "If she keeps her promise, that is, and lets him come to Jeltad, by and by. But he'll never be like Zamm!"

"Give him time," Bropha said consolingly. "They grow up slowly. They're a long-lived race, the Daya-Bals."

"I thought of that, too!" the Co-ordinator nodded. "She'll raise a dozen now before she's done; and among them there might be one, or two— But, by the way she talked, I knew right then Zamm would never let any of the others go beyond fifty light-years of Betelgeuse!"

THE END

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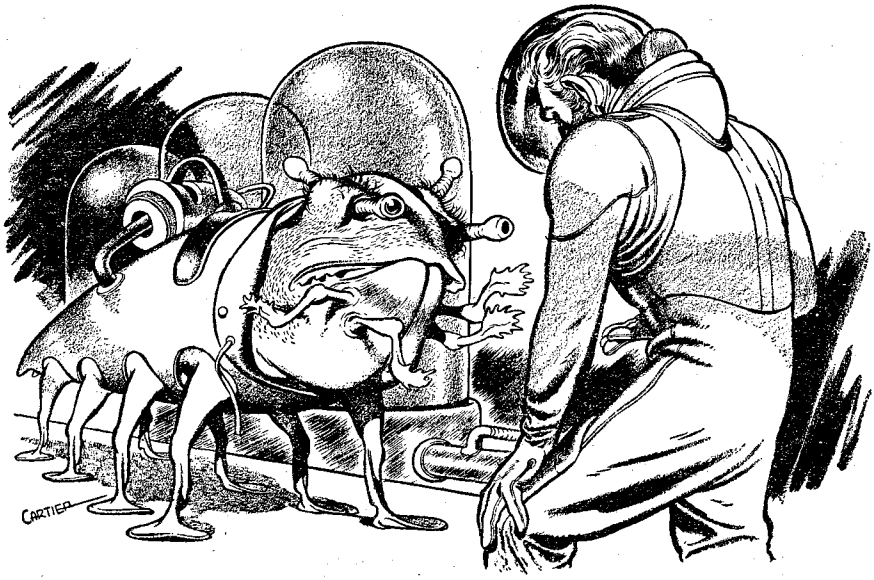

IN VALUE DECEIVED

BY H. B. FYFE

***The real,** genu-wine trader is a man who isn't out for money — but the satisfaction of a winning deal — like trading dime-store beads for first-class mink pelts. But there are native traders, who swindle visitors out of brilliant, perfect machine-cut beads for the hide of a local pest . . .*

Illustrated by Cartier

Rylat was quite disappointed at the barrenness of the planet. As that, it was the only one circling the small white star in Sector Twelve that had offered any hope at all.

"Things are as bleak as at home on Olittra," he thought to Akyro. "Nothing growing but a few creepers and moss. No wonder, with the dim light."

He shifted his four eyestalks so as to examine the shallow hills shown on the telescreen. From above the surface, no life had been discernible. They had made the landing only on the strength of Akyro's detection of

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radiation. That might have meant habitation, which seldom appeared without some form of agriculture.

"It could have been artificial," Akyro had thought, raising his tapering, dull-blue body to the flat tips of his eight walking legs in mild hope.

Seeing the surface at close range, however, he now lost his enthusiasm.

"You look it over," he thought to Rylat. "I'm hungry."

He opened a locker and removed a chunk of synthetic food and a plastic tube of liquid. He manipulated the grayish chunk between two of his tiny eating legs, using the other pair to squirt a drink into his mouth at intervals.

"How can you enjoy that awful stuff?" demanded Rylat in some annoyance. "And how will you like it if we go outside and you get sick in your vacuum suit?"

"One must replenish his energy," replied Akyro contentedly.

Rylat thought a red flame.

"You are nearly as broad as long already," he added.

Before he could invent further caustic ideas, Akyro dropped his food to the plastic deck and waddled hastily to the bank of detector instruments. They were his specialty, upon which he always had at least one eye trained.

"Something?" inquired Rylat.

"Approaching radiation," Akyro answered. "A ship, perhaps."

He worked over his dials, then gave Rylat co-ordinates for his telescreen. His guess proved correct; it was a spaceship. Not one from Olittra, certainly, to judge by the elongated lines. It cruised close above the surface.

"Only one," announced Akyro. "Shall we signal it down?"

"No harm," Rylat agreed.

He crept over to the piloting bench and pushed certain levers. A series of flares shot up into the thinner part of the planet's shallow atmosphere, there to explode into a standard greeting in Galactic Code.

The other ship leaped straight away from the surface at considerable acceleration. Then, as the flares were recognized for a peaceful message, it headed more slowly toward the grounded ship. Rylat gestured approvingly.

"If they can maneuver like that, they must be quite advanced. Perhaps they know the location of uninhabited planets where we can obtain plant life for our sterile lands."

Akyro, intent upon translating the answering flares from the other vessel, made no comment. He analyzed the pattern of radiation to check his visual perception—not all beings in the known galaxy saw the same images from the same stimuli.

"Send them our home identification," he told Rylat. "They say they come from a star in Sector . . . Fourteen, I think. Yes, here it is in the list—Sol, class G, nine major planets, one dominant race inhabiting three planets, members Sector Fourteen Confederation, rating 'civilized.' "

"What are they doing over here in Twelve?"

"Let us not be impolite," reproved

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Akyro. "They may be wondering the same about us."

Rylat thought a bad taste at him, but half-heartedly, for he recognized the justice of the reproof.

"Well, I shall invite them down to meet us," he thought back. "See about unpacking a shelter assembly, in case they come out wearing something clumsy."

Some time later, they watched the port of the other ship open after a landing that met with Rylat's approval. Since they had set up the shelter on the dimly lit, sandy soil a few lengths from their ship, and did not know how well the visitors could see, he lit a portable light-tube to show the location.

Two of the strangers presently bounded across the irregular ground. They had four large limbs apiece, two of which were sufficient for locomotion. Rylat considered their vacuum suits and personal equipment well-made but unnecessarily prettified. He saw no working parts, which suggested added weight to conceal them.

"Notice how easily they run," he observed to Akyro. "They must come from a fairly large, solid planet."

When the Solarians arrived, Rylat invited them by gestures to enter the temporary shelter. Akyro had a heat converter operating, producing as a waste product an atmosphere breathable by the Olittrans. The latter opened the head ends of their suits.

The larger Solarian resorted to the Galactic Gesture Code to express appreciation of the shelter. His vacuum suit was topped by a globular fixture, partly transparent, behind which Rylat could see what must be the creature's face.

There were various rudimentary features, but no small limbs about the mouth. Rylat could not imagine how the Solarian fed himself. The single pair of eyes were further limited by being set immovably in the head.

Yet, Rylat reflected, these beings had obviously overcome such handicaps. Their equipment was, if anything, superior to his own. He decided they must be quite intelligent.

"What does he want to know?" inquired Akyro, as his companion replied to the Solarian's next gestures.

"He was surprised that we set up the shelter in so short a time, and wanted to know what the heat converter is."

"Maybe it is new to them," suggested Akyro.

"I doubt it, for they seemed to lose interest when I explained the principle and how one can produce any element at all as waste."

"Have they identified themselves?"

Rylat went through a series of formal gestures with one of his forelegs. The Solarian answered in kind.

"The one with the reddish fur on top is called 'Cloth-maker,' or perhaps 'Weaver' would be closer. The other is named 'Strong-foreleg' as nearly as I can translate."

He proceeded to exchange gen-

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eral information with the Solarian. The smaller one, meanwhile, inspected the shelter curiously. He showed interest in the system for supporting the dome with the pressure of the inclosed atmosphere, and made rough gestures to Akyro to indicate admiration for the simple but effective entrance chamber. He did not pay any further attention to the heat converter, apparently taking it for granted after the first explanation.

From the conversation between Rylat and the Weaver, it developed that the Solarians were also a form of oxygen-breathing life, but that they required much denser air than their hosts. Rylat reported that they acted rather like traders. When he told the Weaver that he and Akyro were merely on an exploring expedition, the Solarian amended his business offer to a suggestion that they exchange souvenirs.

"Perhaps they could tell us of some planet such as we seek," Akyro thought to Rylat.

"I judge it unwise for us to seem overcurious. They might demand some fantastic reward if we reveal the necessity of our finding new plant stocks."

"But that would hardly be ethical," protested Akyro.

Rylat thought a stupid, newly-hatched cub, and told Akyro that he was always too trusting with alien beings. "Time enough," he suggested, "to worry about ethics when they were acquainted. Besides," he added, "the Weaver has invited us to see their ship. We should learn what they are like."

They left the shelter one by one. The Solarians, being considerably larger, squeezed gingerly through the exit. Then, they led the way to their own ship, moderating their pace politely to accommodate the Olittrans.

The Solarian ship fulfilled the promise of the equipment of its crew. Good workmanship was the rule in the section into which they were guided. Rylat was surprised at the luxury that permitted a division of the living and piloting quarters.

"But then," he reflected, "they are traders, and doubtless can afford to waste materials on such refinements."

"What does he think?" inquired Akyro, as the Weaver made a series of code gestures to Rylat.

"He invites us to inspect samples of their cargo. I fear he still believes us willing to trade something."

Out of politeness, they permitted the red-topped Solarian to lead them to another compartment. Here, he displayed various wares. The Olittrans noted that the Solarian objects ran mostly to gadgets and precision instruments, while things they had obtained by trading were in many cases minerals. The Weaver displayed with strange pride some large chunks of white carbon crystals, and small quantities of some of the heavier elements. Those which radiated were kept in shielded containers.

Rylat did not blame him for that.

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He himself had once incurred a severe rash on his thick hide when he had left too much uranium—a waste product from a heat converter—lying around outside his shelter. The Solarians, without their vacuum suits, looked unpleasantly thin-skinned. He could actually see outlines of a circulatory system right through the Weaver's hide.

"There is little here to attract us," he thought to Akyro.

"True," the other agreed. "Their workmanship is very fine, but our own instruments are adequate. As for the minerals, we could make up any quantity of those in a short time."

"I shall not tell them exactly that," decided Rylat.

"Why not?"

"Oh . . . it would hardly be polite."

He indicated to the Weaver that it was time for them to return to their own ship, at least temporarily, to check its mechanisms and to replenish the tanks of their vacuum suits.

As they passed forward through the living quarters, Rylat glanced with one eye at a flat-topped piece of furniture upon which the other Solarian was setting out food and drink. This included, he noted half-unconsciously, a portion of an obviously synthetic substance, but also a number of what looked like vegetables. In fact, one platter held a heap of untreated white stalks with green leaves.

The idea came to Rylat that these must be raw and fresh plants, grown recently; and he turned another eye upon them.

Grown recently!

The realization smote him with almost physical force. His eyestalks retracted halfway before he could control himself, and his walking legs involuntarily bowed in the vestige of a crouch.

Akyro noticed this evidence of excitement, a holdover from primitive times when the best physical defense of their remote ancestors had been to flatten themselves to the ground and rely upon their thick, armorlike hides.

"What is the trouble?" he asked.

"Look at the food!"

Akyro looked, and *his* eyestalks twitched.

"A fresh plant! Quickly—ask them where they got it!"

Rylat controlled himself with an effort. The red-thatched Weaver had turned his head at the Olittrans' hesitation, and was training both eyes curiously upon them.

"Pay no attention to it," Rylat ordered his companion. "And come along! He notices our actions."

"For your love of posterity!" Akyro insisted. "Ask him where he got it! *Ask him!*"

"Later," Rylat thought to him, moving toward the exit port between that compartment and the piloting chamber forward.

Akyro bounced irritably on his walking legs and stared back at the foodstuffs with three of his eyes.

"Do not be a fool!" he urged. "Do you realize what it may mean to us?

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Since the blight struck Olittra, and with the population what it is? We were not sent to pick up pretty crystals, you know!"

"You need not be sarcastic," retorted Rylat. "I know our mission as well as you, but I have also heard about these races proficient in trading. I know what I am doing."

"Are you sure?"

"Of course! Now stop acting mentally deficient and follow!"

Akyro thought a bottomless swamp of sticky ooze—but quietly to himself—and followed the others to the exit.

The little Solarian politely donned a vacuum suit to see them safely through the outer valve. Rylat gestured that they would return before long, and led the way across the sand.

Back in their own vessel, after a routine check and a brief rest period, Akyro put a record of the Galactic Gesture Code on the visi-player for a thorough review. Consequently, he was able to catch some inkling of the conversation when next they called at the Solarian ship.

He was still sufficiently uncertain of the motions to make any communications himself, but he understood the Weaver's greeting and opening remarks.

The Solarians, it developed, had stopped at this star only in search of barter. They were as disappointed with it, in their way, as were the Olittrans.

"We, also, were passing and stopped out of curiosity," Rylat signaled. "But we are merely explorers."

"Traders such as we," waved the Weaver, "often must be their own explorers."

"That is interesting," Rylat told him. "Perhaps you would describe for me how a trading expedition operates."

Akyro was annoyed.

"Why make yourself a simpleton?" he asked Rylat.

His companion briefly thought a set of eyestalks tied in a knot, and continued his gesture talk. The Solarian explained that it was not always necessary to obtain something more valuable than what one gave for it.

"Sometimes," he indicated, "the mere act of transporting an object to a different planetary system increases its value enormously. It may be rare or peculiarly useful there."

"It seems close to cheating to me," thought Akyro, but his thought was ignored.

"Well, of course, I would not understand these matters," Rylat informed the Solarian.

The Weaver gaped at him a moment with small blue eyes, then turned to Strong-foreleg. The two Solarians exchanged a series of oral vibrations which apparently served for communication with them. After a little discussion, the Weaver turned his red-furred head again to Rylat.

"Perhaps, for luck or amusement or what you will, we might make some token exchange. It would provide us with souvenirs of this meeting."

Rylat expressed willingness. There

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followed rather floundering attempts on both sides to suggest something desirable to the opposite parties.

The Solarians regretfully declined any of the Olittran instruments that Rylat thought he could spare, apologizing that their own were satisfactory. Nor did Rylat profess any interest in the Solarians' knicknacks, picked up on half a dozen worlds lately visited.

"But we have some very good maps of Sector Eleven," he offered in his turn.

The Weaver thanked him, but the Solarians did not plan to travel in that direction. In the end, he suggested that they visit his cargo compartments again.

"Ask him about the plants!" Akyro urged.

"How can I?" Rylat thought back. "What have we to offer for such information? They will surely want something!"

"Well, if you refuse to ask him, I shall stay here and watch to see if his friend brings out any more of them."

"As you please," answered Rylat, and followed the Weaver from the compartment.

They walked along a metal-decked corridor to the same storeroom of samples that Rylat had seen earlier. He found nothing new that interested him, and was careful to make this fact diplomatically clear to the Solarian.

During the process, he felt Akyro calling him, and so he indicated as soon as possible a desire to rejoin the others.

"They grow them themselves!" his friend greeted him, as he entered the living quarters with the Weaver.

"Explain that!" demanded Rylat, noting that the Solarians were also seizing the opportunity to communicate privately.

"The *plants!*" Akyro thought to him. "They have tanks on the ship where they grow them in water with chemicals and artificial radiation. I have seen them!"

"How?"

"I stood here looking bored until Strong-foreleg showed me through some of the compartments."

"Did you let him see what interested you?" Rylat paused to think a hollow bubble of clear plastic. "Of course you did, or they would not be vibrating their mouths at each other. Really, Akyro!"

The Weaver turned to Rylat and inquired if he might not be interested in seeing the hydroponic tanks. Rylat agreed without outward enthusiasm. He hoped that the Solarian would not know how to interpret the slight shrinking of his eyestalks.

They all walked into the compartment mentioned, and Rylat's walking legs nearly buckled.

All about the bulkheads of the compartment, and in rows down the center, were large, transparent tanks with plants in various stages of growth. Most were some shade of green in the parts that Rylat guessed normally grew above the ground.

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He allowed himself, for a brief moment, to picture Olittra's blighted agricultural areas repopulated with such plant life. The food problem he would solve if he could only get some seeds or cuttings! He was *so* tired of synthetic foods—

"They are very pretty," he signaled. "They remind me of the gorgeous foliage of my home planet."

"Rylat!" came Akyro's horrified thought. "How can you deliver such an untruth? It is not ethical!"

"It is not an untruth. *Any* vegetable matter at present makes me remember Olittra. Besides, how could he know our vegetation was mostly purple?"

He had to request that the Weaver repeat his last gestures.

"I said, we would be very glad to let you have a few. They are quite nourishing."

"Oh, we seldom eat such," replied Rylat. "Still, they would be pleasant decoration in our bare and functional ship."

The Solarians exchanged stares that made him wonder if perhaps they, too, had a form of telepathy. Then the Weaver reached into the nearest tank of dark green specimens.

"Perhaps," Rylat began; and then, as the Weaver looked up, "but never mind. It is not necessary—"

Akyro's walking legs folded completely. He crouched on the deck, heedless of the Solarians' astonished glances, and thought a violent volcanic eruption. Rylat caught the whole image distinctly. It included himself at the zenith of the up-jetting burst of flames.

"I was about to suggest," he signaled the waiting Weaver imperturbably, "that perhaps you could spare us a complete tank, since you have so many. Growing new plants would be an amusing hobby to us in the loneliness of space."

The Weaver signified that he would be only too pleased. He insisted upon including a supply of chemicals and a special light-tube. He and Rylat examined the latter, and the Olittran assured him that he could arrange to feed the proper power into it. The Olittrans carried enough water to supply the tank.

Both Solarians donned vacuum suits to assist with the transportation of the tank, which they thoughtfully inclosed in an insulated cylinder. Rylat was qualified to bear only a token share of the burden across the sand outside. Akyro trailed the group unsteadily, eyestalks still a bit retracted.

The Solarians helped get the cylinder inside the Olittran vessel, but declined to be shown around.

"Probably feel a bit clumsy because of their size and those bulky suits," Rylat thought to Akyro.

To the Solarians, he expressed appreciation and asked if they had not hit upon some gift he could make in return.

"It is nothing!" waved the Weaver. "Do you intend to leave soon?"

"Rylat!" pleaded Akyro. "Tell him *yes,* and quickly! If they take time to reflect, they will surely realize the value of what they are giving us!"

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"Patience! I, too, deeply desire to mount a starbeam."

He signaled to the Solarian that they did intend to leave almost immediately. The Weaver expressed regret.

"But tell me what we can do," insisted Rylat, fearful lest cause arise to make him surrender his booty.

"We had considered inspecting the planet's surface and its mineral content," the Weaver informed him.

"An interesting hobby," replied Rylat doubtfully.

By the looks they exchanged, the two Solarians were as puzzled at *that* as he was at their project. Who cared what minerals could be dug up? One could convert them any time.

"Our object," the Weaver tried again, "was to make ourselves comfortable on the surface and take a holiday from the confines of the ship."

"Ah!" answered Rylat, comprehending at last. "Why, if you wish to use our shelter, you are more than welcome."

The Weaver accepted with thanks, but wondered about the Olittrans' departure.

"It will not matter," Rylat assured him. "We can pick up the shelter the next time we pass this way."

"Rylat! *Give* it to him! Let us leave this place with some dispatch," pleaded Akyro.

"In fact," continued Rylat, "I recall that we have another, so you might as well keep the one outside. I will get you a set of instructions for the entrance valve and the heat converter. You will be able to understand the diagrams, at least."

He did so, and after many exchanges of courtesies, the Solarians departed.

Akyro wasted no time in securing the tank of plants in the hold. As soon as the Solarians were safely in their own ship, Rylat took off.

He spiraled away from the planet and set a tentative course for the limit between Sectors Twelve and Eleven.

"About my remark on returning to pick up that shelter," he teased Akyro, "you did not believe I would really risk facing them again? After cheating them like that?"

Akyro did not reply. Rylat turned an eye toward him and saw that he was watching his dials intently.

"What is it?" he asked, vaguely uneasy.

"Moving radiation of the same pattern. It must be the Solarians, leaving the planet."

"How fast?" demanded Rylat, wondering if he dared step up the acceleration even more.

"About as fast as we, perhaps a bit more."

Rylat's eyestalks cringed. He hastily estimated the emergency power available to him.

"Enough to catch us?" he inquired anxiously.

"Oh, no," Akyro told him calmly. "They are heading in the opposite direction."

"What?"

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"No doubt of it. As fast as they can, apparently."

Rylat rose from the piloting bench and joined the other at the bank of instruments.

"I do not understand it," he thought to Akyro. "They claimed they intended to stay. And we certainly left nothing to make them hurry home."

"Perhaps the mechanism of the entrance valve?"

"No . . . they had better on their ship. And they showed no special interest in the heat converter. I doubt they would want to play at transmuting elements."

"Who would want a heat converter for that? They, too, must have better ways."

"Exactly. So what could be on their consciences?"

They pondered until Rylat returned to the piloting bench and curiously focused the image of the Solarian vessel on the telescreen.

"Let us admire their folly," Akyro suggested, "but not to the extent of lingering."

"No . . . and yet, I wonder why—"

He watched the other ship move out of focus.

"Look at them go!" he thought to Akyro. "Anyone would suspect that *they*—not we—had practically committed theft!"

THE END

THE ANALYTICAL LABORATORY

With limited space this issue, we will simply present the figures. The spread this time is rather sharp into a first group and second group, I notice, however.

August 1950 Issue

Place	Story	Author	Points
1.	A Pinch of Culture	Bernard I. Kahn	2.03
2.	Last Enemy	H. Beam Piper	2.13
3.	Git Along!	L. Sprague de Camp	3.41
4.	The Devil's Invention	Alfred Bester	3.60
5.	Prison Bright, Prison Deep	Frank Belknap Long	3.85

Incidentally, enthusiastic radio hams had best hold off on trying to build that Thinking Machine—unless you're a full-fledged electronics expert. The idea is simple; building it is tricky!

THE EDITOR.

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TOOLS OF THE TRADE

BY RAYMOND F. JONES

*A **technical** civilization is peculiarly interdependent. Remember the nursery story about the old woman who had to get Fire to burn Stick to make Stick beat Dog, so Dog . . . and so on? Machine cultures can get that thoroughly fouled up!*

Illustrated by Miller

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The desert sun was slowly lighting the sleek, lazy backs of the ships on the field of "Joe's Service and Repair." It lit the distant hills, too, promising a day of greater splendor than it could possibly deliver in this barren land. But Joe didn't mind. He liked big plans.

From the window of his second-story office he watched. His normal working day began at dawn, and in the outer office he heard the entrance of his secretary, Mary Barnes. She was devoted to him, but her quick heel taps registered the irritation of having to rise so early.

Joe stoked the big cigar in his mouth with long, pleasurable draughts. The field was getting too small. Time for another expansion, almost, but he wondered if this time he should set up a separate location somewhere else. Concentration meant efficiency but the bureaucrats who had to keep tab on him worried about "Joe's Service and Repair" becoming too big. Steadily, however, they were becoming smaller and smaller fry. Soon they wouldn't matter at all—he hoped.

He marveled at the colors of the hulls. At midday most would be dingy, space-pocked gray, but now they seemed to glow with bright yellow and pink and hues of shining steel.

There was the big *Nadian*. She was having a new drive, atomic, Class Six, he recalled. Beside her was the much smaller *Iban* with new atmosphere pumps to be installed—half the crew had died getting her into the repair depot. Most of them represented tragedy, but that tragedy was less because of him.

He looked beyond the *Nadian* to the fine, golden hull that loomed even bigger a little way beyond. He squinted for recognition, bending forward until his cigar almost touched the windowpane. Then he recognized it.

"Mary! How did that royal barge get on our field? Mary—!"

She came from the outer office at her own pace, but with her morning coiffure adjustments only half completed. "I have the entry slip on the *Martremant,* if that's what you're worrying about," she said. "It was in the hopper this morning—came in during the night. It is a very big job. She was rammed by a freighter that got out of control at Capitol Field just as the First Administrator was about to take off."

"I can refuse service to anyone, and I refuse to have anything to do with those junketing politicians. Good-will tour—bah!"

The *Martremant* was the personal ship of the Galactic Union's First Administrator. With two hundred of his commissioners, he was making a good-will tour through member galaxies. Since it was, of course, impossible to visit all, the party had honored Earth greatly, her galaxy being one of the most remote from Administration Central.

Joe looked up sharply as he became aware of Mary's silence. "Well, I can, can't I—?"

"I'm afraid not, Joe." Her brown

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eyes watched him seriously. "Your charter forbids discrimination, except by government ban or permission. I'm sure there will be neither in this instance. The job carries a special government contract straight from the Capitol."

"Not only do I have to fix this barge, but, as a taxpayer, I have to foot my own bill?"

"Stripped to its bare essentials, that's about it. The government is half panicky about the accident. Up to now the junket went off as rehearsed. It looked as if the support of the First Administrator had been assured for Earth's candidate when the Administrator's term expires in six months."

"Now the political plums have all turned sour because some chowderhead rams the royal barge, is that it?"

"That's it. You can bet nobody slept on Capitol Hill last night."

Joe chuckled suddenly. "Tough, isn't it? The vips will have to wait for repairs or a new ship. Wouldn't it be tough if we couldn't find or make one essential part? Of course, it would take a long time to find that out. I think I'll like this job after all."

"Why don't you just get it fixed as quickly as you can," said Mary crossly, "and get it off your mind? You breed ulcers this way."

Joe's face sobered. "All right, Mary. We'll do it your way. I think the efficiency of this office has picked up thirty percent since you came—but I wonder if we have as much fun—"

"It's not fun to hate anything as much as you do politicians."

"A person can't be sweet all the time. I don't know of more suitable use to be made of the pompous windbags."

"If I remember elementary history correctly there was a time of technological government."

"A bunch of plumbers' apprentices," growled Joe. "The gang that got in was worse than the politicians."

"That's what everybody else thought, too."

"Look, you're changing the subject." He took her arm with fatherly gentleness and led her closer to the window. "That hulk out there cost a billion, at least. Its operating expenses on this hundred-day junket are a quarter million a day. Who pays it? Little guys like me and you. A tax on this, a tax on that—half our life and substance are dribbled away supporting those . . . those junketeers!"

"Little guys like me and you—! That calls for an increase next Thursday. Here comes Mr. Litchfield. He looks as if he has troubles on his mind. Ten to one it's *Martremant* trouble."

She retreated to her own office as the chief repair engineer parked his scooter outside the building and started up the stairs.

Howard Litchfield looked more like a professional wrestler than a

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crack engineer. He carried his elbows slightly away from his body as if perpetually waiting for someone to photograph his strong-man pose.

"You've seen, I suppose," he said. "The *Martremant?*"

"We're going to have trouble on this job."

"Why—what is it?"

"This is one of the eight third-order ships in existence. We've never had a third-order job in here before."

"So what? There are twenty other jobs out there that are the first we've seen of their exact kind. The crew of the *Martremant* can give enough cerebral analogues to pin it down."

"They could—if they were alive."

Joe slowly removed his cigar. "What happened to them?"

"The freighter that knocked the ship out drove through the side of the officers' quarters, and ended by almost splitting the drive chambers in two. Not twenty percent of the machinery is good. All crewmen with technical knowledge are dead. The only ones left are cooks and stewards, and they're not Radalians, who built the vessel."

"And politicians—" added Joe.

"Who won't move out."

"What?"

"That's right. The First and his commissioners are still aboard."

"What about the atmosphere machinery?"

"That's the twenty percent that's left. Each state suite is self-contained and independent. None of them got damaged."

"Well why doesn't the government just give them a new ship and junk the old one? It would be cheaper. Don't forget who pays this bill."

Litchfield shook his head and sat down on the polished desk. "There was some mention of it, I gather, but the First wants his personal barge back in Grade A shape with not a scratch showing, so that's what he was promised. We have to deliver."

"It's not his ship, anyway. It belongs to the Galactic Commission."

"Sure—but who's going to remind him? He's the F. A."

"*I'd* like to remind him! I'd—" Joe sensed the uselessness of another tirade. He recalled Mary's advice—get the ship fixed.

"I'll help you," he announced decisively. "Let's get that thing off the field by the end of the week."

"This is already Monday!"

"A man could breed a pretty good-sized ulcer in six days."

On the small scooters used for transportation about the vast field, they sped towards the hulk of the *Martremant*. It was a squat tube of a hull about twenty stories high and three times as long. Joe gasped at the great gash in the rear third of it.

"It would have been easier to take the tools to the job than bringing that piece of junk here. The freighter must have rammed clear inside and then turned and come out sidewise."

"It exploded. That's why nobody

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will know what happened for sure."

Lights had been placed and Litchfield's analysis crew were already deep in the process of photographing and carefully dismantling the wreckage.

As Joe looked about, he became aware that there were others present who had no business to be—but he knew who they were.

You could tell them by the crease of their clothes, the glistening shine upon their shoes, the dainty way they reached down ever so often to dust imaginary specks from their knees.

There were four of them this time. The leader approached with outstretched hand, and recognition slowly flamed in Joe's eyes.

"I'm Mr. Johnson, of the President's office. Perhaps you recall I used to be in Field Inspection," he said. "These men are—"

"I remember," said Joe slowly, glancing at Johnson's graying temples. "You're the Capitol's current wonder boy. You write speeches now."

The man flushed, but he went on. "These men are Mr. Burns, Mr. Cornwall, and Mr. Hansen, who are of the Presidential Advisory Office."

Joe took the hand of each in sullen challenge.

"We tried to locate you last night to discuss the repair of the *Martremant*. We finally authorized its entry, since it had already arrived, anyway."

"I was home asleep until five and down here at five-thirty. You didn't look very hard for me."

"Perhaps you have been acquainted with the tremendous significance of this job," said Johnson.

"I have. You want it done promptly so you can all get your fingers in the big pie to be cut next election day."

The advisors' faces grew masklike. "The ship must be repaired with dispatch and accuracy, in order to minimize the inconvenience to the Commissioners and the First Administrator. We are authorized to place every government facility required at your disposal and issue a blank check for the work."

"On my account!" cried Joe. "You offer me a blank check on my own bank account just like you were Santa Claus."

"I'm afraid, Mr. Williams, that you don't understand the matter of appropriations."

"I'm afraid I do. But if you want this hulk fixed my advice is to get out and stay out. Every hour you clutter up the field delays the work another day."

"It is necessary that we remain. The President has delegated us to be on the site and issue him hourly reports on the progress of the work."

Groaning, Joe turned away.

Above their heads, he could see successive floors blasted upward and torn with jagged holes. Swaying lights and miniature shadows of crewmen showed the analysis work going on in those far levels.

"Did you check the files for

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Radalian analogues?" he asked Litchfield.

"Yes. We've never had any in here before of that race. The First and his Radalian Commissioners have already been asked. They refused, of course."

"Naturally," growled Joe. "Who could expect a politician to let his brains be poked into? We'd find out what was behind the double-talk we get. Get a transcript of plans from Radal then."

"We already tried. They report the plans are confidential, top-drawer, and super secret. Therefore, they cannot be given out."

Joe stood for perhaps five seconds while his blood pressure mounted. Then he walked quietly to where the four advisors were watching. He spoke to them for approximately thirty seconds. They held a consultation and then moved towards the front end of the ship where the officials held forth in their luxurious suites.

Fifteen minutes later they emerged and went to the communications office. Within an hour the transcript of the plans was on the desk of Litchfield.

It made Joe feel good. He smiled expansively at the stack of sheets. "That is the first time I ever saw a politician that was any good in a pinch. Now, we ought to be able to go on without any more trouble. We won't even need an analogue. Maybe I ought to go back to the office and see what Mary's got for me. If you need me—"

Litchfield listened absently. The responsibility for repair was his. The stack of sheets describing the drive was three feet high. It would be necessary to resort to cerebral absorption methods to comprehend all that mass of data, but that didn't worry him. He had opened the broad structural schematic and the stereoscopic representation of the engines as they were in placé.

The tan of his face became suddenly a shade lighter. "Wait a minute, Joe. Our troubles aren't over yet. This may be the time we don't make it—"

"What's the matter now? We've got the plans of the ship. All we need to do is follow them. Anything a critter can build, we can fix."

"Providing we have the tools."

"Tools? We've got a tool department. Art Rawlins can build any tool you need."

"Think Art ever heard of the molecular spray technique?"

Joe slowly dropped his cigar into a spittoon and retreated from the doorway. "Molecular spray—it's only a rumor. You hear it at least once a week."

"Not any more is it just a rumor. These plans specify it."

Joe bent over the charts. They had been given English titling automatically during transmission. Litchfield was right. The engines were designed to be constructed by spray technique.

He knew what that meant. It was the *only* way they could be built.

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Any other construction method would require a new design for the whole power plant.

Joe knew virtually nothing of the technique. He had never found anyone who had even seen it. According to rumor, however, it was remotely akin to the printing of electrical circuits which had been common for hundreds of years.

It was a means of building up three-dimensional objects of unlimited complexity by spraying on molecules in precise streams of variable constituency. The spray was keyed by an intricate matrix system that steered automatically the tool mechanism and changed the quality of the molecules from uranium to soft putty if that was called for. It was possible to leave channels, build in wiring, and assemble parts in any degree of intimacy required by design, a degree far surpassing that possible by clumsy nut and bolt or welding techniques.

"There ought to be spray equipment aboard ship," said Joe. "If repairs were required, I understand they would have to tear the thing down and build it up again."

"Could be, but any sign of a machine shop was volatilized. As it stands, we'd have to build a factory to build the tool before we could even start on the ship—provided we could get plans for the tools."

"That shouldn't be hard. We could get them the same way we got the drive data."

"Let's try once more to get them to settle for conventional drive. We can set them up with a good second-order outfit. Maybe the Presidential Advisors can put some pressure in that direction."

Joe called them in and explained the situation. They tried to look as if they comprehended what spray technique was all about, but Johnson shook his head.

"I guess we should have mentioned at first," he said, "that the Administrator asked if you understood the spray methods. We said you did, because we felt sure you would have no trouble with construction methods. He said that was fine because his people only rented the equipment from the makers—some other race who won't let it out of their hands. The tool design is not available."

"Then we'll have to substitute," said Litchfield. "There's no possible way to obtain spray tools in any reasonable time. We can install a good second-order drive. You'll have to make it right with the First."

"You want to substitute a simpler, less efficient drive?"

"If the junketeers want to get under way in the next six years."

"We can't allow it," said Johnson. "This represents the thing the President sent us to guard against. The ship *has* to be repaired as it was."

"That represents the political mind at work under a full head of steam!" exclaimed Joe. "We can't be given the tools but we have to do the job anyway! Now, listen—"

"Suppose *you* listen, Mr. Wil-

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liams. How would it look for the First Administrator to go limping around the galaxies explaining that he was behind schedule because his ship got wrecked on Sol III and the Terrestrians were incapable of matching his drives?

"How would it look, not only from our own political viewpoint, but from the standpoint of your technical abilities, your business? Consider the effect if it got spread around that 'Joe's Service and Repair' had muffed the First Administrator's job? In spite of my own personal distress in the matter, it is with a great deal of pleasure I view your position over a very rickety barrel.

"Good day, Mr. Williams—Mr. Litchfield."

"All right—here's the last word," said Joe. "We'll fix the *Martremant* so well that the original builders won't know it's been repaired—and by the end of the week. You may include *that* in the next hourly report to the President."

Litchfield didn't look up when they had gone. He continued to stare down at the drawing, but he spoke to Joe. "You know what you just said?"

"You bet I do! Call in all three crew shifts who'll be on the repair job. We'll give them cerebral on the drive plans. Get Art Rawlins and his whole tool crew down here. Start them making matrices from these plans.

"Then tell them to make some spray tools and get to work."

"Just like that?"

Joe's face was suddenly more bitter than Litchfield remembered it for

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a long time. He leaned over the table of drawings to look out the window. The quartet of advisors seemed in a jovial mood as they went towards the ship.

"They may not represent the President's views," said Joe, "but for themselves they've already written off this crop of plums. They have given up, but they think they're going to watch us lose our shirts in this deal.

"Remember the times we beat Johnson when he was in Field Inspection? He hates our guts. They all do, because we produce, and they can't do anything but sit on the sidelines. They make believe they run the show while inside they eat their hearts out because they are so incompetent in the ordinary business of living.

"If we fail on this job, they'll see that we're blackballed in every port in the Union. The fact that we represent Terra in the field of service and repair doesn't matter any more. They figure we can be replaced."

From long custom Litchfield gave only half an ear to Joe's political tirades, but he saw that Joe was completely right this time. The politicians whose strangling regulations had been loosed by Joe's persistence were not going to let this golden opportunity go by.

Suddenly, he was mad, too. "The end of the week," he muttered.

Art Rawlins considered himself the biggest man on the place. Physically, he was. Joe wouldn't have tolerated the huge, slow-moving bulk in any lesser man, but Rawlins was probably the best tool engineer on the planet.

"You can't make things without tools," was his motto, "and I'm the man who makes the tools that make the machines," he finished modestly. "Without me, nobody works."

He was given the problem without the political angles. There was no dismay in his reaction. Rather, he scented in it the challenge of his career. He exhaled a happy snort of enthusiasm as Joe finished outlining the details.

"Molecular spray!" he exclaimed. "I've heard of it half a dozen times in the last three months. But no crew that has come in has ever seen it. Now we've got a ship that uses it!"

"But without analogues of the designing race, and with no plans of the spray, can you build it?"

"I don't see why not. There's not an artifact made that doesn't leave tool marks indicating the mental processes of the mind that made it—and the tools with which he built. There should be enough information in the plans of the ship to identify and build the tools."

"All right. I hope so. We're setting up a cerebral for the repair crews this morning. You'll want to get in on that with your crew. Get them into the cerebral room in fifteen minutes."

Cerebral indoctrination was a method of short-circuiting the acquiring of data. It implanted items of

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information directly into the cortex without sending it through the long, circuitous, interference-filled channels of the senses.

From the original data, scanning machines produced impulses exactly like the waves of a perfectly healthy brain as it thought through the problem. These impulses acted directly upon the molecules of the recipients' brains, imposing the data within.

Joe and Litchfield sat in on the session, absorbing the vast flood of information regarding the design of the *Martremant*. When it was over, they felt sure they could have designed the tools by which the engines would have to be built. But they knew it was a false illusion. There was still a tremendous job of analysis to be done, and they lacked Art Rawlins' special skill in evaluating the data they had.

The repair crews filed out of the room at the end of the two-hour session. Rawlins and his men continued to sit there in their chairs, their headpieces in their laps. It was when he saw them that Joe felt the intense sinking inside him.

"What's the matter?" he said thinly. "Wasn't it any good?"

Art Rawlins' wide jowls circled downward to rest against his upper chest. "Let's run through it again, Joe. This time change the differential to get fabrication analysis instead of design and function."

The smaller group of men sat there for another two hours while the machine went through the thousands of drawings and stereoscopes once more. When the lights were on again, Rawlins was slumped still lower.

"I was right the first time," he muttered. "It's no wonder the spray technique is so scarce if the inventors want to keep it hidden. Nobody could figure it out from scratch."

"Why?"

"The tools . . . the tools to make the spray—we can't make *them.*"

For about three quarters of a minute Joe thought he hadn't heard right. Then he saw that Rawlins wasn't joking, but was perfectly serious in his absurd sounding statement.

"What do you mean?" Joe asked. "I don't understand."

"We'd have to go down through four or five separate derivations to try to get to the basic technologies involved. By then the trail would be so faint and the variables so large that it would be meaningless."

"I never heard of taking four or five derivatives of a cerebral," said Litchfield.

"Neither has anyone else. It's never come up in such a series as this before. Look: We now have an understanding of what the third-order drive engines are like. We know what the molecular spray tools to build them are like—but we don't know how to build the tools to build the tools with which to build the spray—and maybe one order of tools below that. See what I mean?"

Joe's voice sounded awed by this complexity that he had never im-

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agined. "It still sounds crazy."

"That's the way it is. Take our tools. Suppose an aborigine could utilize cerebral processes to analyze a sawed block of wood, for example.

"He would first discover the need of a steel saw and would get a pretty good idea of what it was like. His next derivative would be the machine tools to make the saw. That would be pretty faint. He'd go on down to steel making processes and discover the necessity of iron ore—but he'd never reach any geological knowledge that would show him how to locate it. He'd never get as far as the technology of smelting it or tempering it. Those items just wouldn't be there in the sawing process.

"So it is with the spray. There are at least five separate and unknown technologies that step down to any level with which we are now familiar. The chance of *our* discovering how to build a molecular spray are absolutely, mathematically zero. The information has got to come from outside, or not at all."

"Nevertheless, the ship has to be repaired and off the field by the end of the week," said Joe.

The others in the room stared at him with a sort of pity as if his mind had slipped into a rut from which it would never emerge.

"Go over it again," he said. "Try it on down to the hundredth differential if necessary. Drain it of everything it's got, and then have at it again.

"I'll see you later."

Litchfield followed him out of the analysis building into the hot sunlight of the field. Dingy, dust-colored haze hung over all the desert now and the distant hills were shaded a dirty color. He remembered the splendor of the morning and looked accusingly skyward. If any day was ever a bust, this one was.

They walked half of the mile to the site of the wrecked *Martremant* before either spoke. Then Joe stopped, looking towards the ship with grim defiance shaping his face.

"Howard," he said slowly, "in all the rumors you've heard about the molecular spray, whose name has been connected with it? Did you ever hear before of this mysterious, secret race that's supposed to have concocted it?"

"Why, no. It's always mentioned in connection with the Radalians, but I supposed that was because the Radalians appear to be the only ones using it in their third-order ships—after what Johnson reported about the First."

"I don't believe it. It's too thin. I think the Radalians themselves built it."

"That's crazy! Why would they be withholding it when we can't fix their ship without it?"

"Only the special gods of the politicians could answer that one. The whole thing reeks of the thinking of the political mind. Wherever a political deal is going on there are always lies and counterlies. In this deal, one of them is the story of the mysterious builders of the molecular

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spray. And there is one way we can find out with absolute certainty."

"How?"

"We'll get us a Radalian analogue."

There was a white plume of dust growing slowly in their direction from the damaged *Martremant.* At its head were twin scooters bearing two of Litchfield's analysis crew. The illusion of slowness disappeared as the little carriers crackled up and stopped with a burst of gray dust.

"Have you got trouble?" Litchfield asked.

"Trouble!" one exclaimed. "Those crazy politicians—you've got to get them out of there."

"Where?"

"Everywhere. They're loose all over the place. They got tired of sitting in their plush staterooms so they put on pressure suits and now they're kibitzing all over the place—telling *us* how to do our jobs! Th windbags—!"

"At least our friends from the President's office ought to be able to keep the vips out of our hair while we work," said Litchfield.

"Not only that," continued his crewman, "but their suit exhausts smell up the place until we can't breathe."

"You say they're trying to tell you how to do the job—?" said Joe.

"Yeah—I finished a picture of an assembly and was starting to tear it apart when one of these walking nightmares suddenly sticks out ten of his arms or legs and *garrmps* in his own language and then says, now on *my* world, young man, we perform such an operation *this* way!"

"Were any of them Radalians?"

"I don't know, but you've got to get them out of the way."

Joe turned to Litchfield. "They're trying to show the man how to do his job. What more could we want?"

"A bunch of junketing, kibitzing commissioners won't do much good. They couldn't run the ship, let alone build it."

"No, but I'll bet if we had an analogue—a Radalian one—*we'd* know how to build the tools to build the tools to build it. We could differentiate all the way down to the most basic technology required."

"I suppose you'll just step up to the First Administrator and ask him for it."

"Something like that. I've sparred with them long enough to know something about how political minds tick. One thing they can't resist is a Tour."

The atmosphere inside the ship was foul. There were at least a score of clumsy, alien pressure suits within range of their vision as they climbed in through the rent in the hull.

Some suits were squat, some tall, some with eight appendages, some with three or four. Some were filled with liquid, others with gas of chemistry and pressure that would be instant death to a Terrestrian.

It was the exhaust from some of these that Joe and Litchfield smelled immediately. Methane, chlorine, and

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fluorine were the least deadly that they recognized.

And every one of the politicians was equipped with a cerebropath by which he could make himself heard and understood in order to inflict his opinions on the helpless workman nearest him.

Close by, a six-appendaged creature was earnestly instructing a workman in his job—and exuding a foul aroma that Joe didn't recognize at once. While they watched, the workman quietly rolled over with his staring face upward.

The alien commissioner straightened in perplexity. "That fellow is incompetent. We can't allow such to work on our vessel. See that he is replaced."

And the creature marched austerely away.

Funny, Joe thought. You travel a million light-years and find creatures that look like something that should be crawling the bottom of the sea. Even among them a politician is a politician—arrogant, demanding, and wholly ignorant of ninety-nine percent of the subjects upon which he essays to pontificate.

Joe and Litchfield hunted up the advisors and explained the problem.

"Sorry," said Johnson. "It *is* their ship, you know. If you can't stand their breathing methane down your necks, you'll just have to work in pressure suits yourselves."

In the eyes of Johnson and the three others Joe could see the grinning faces of all the host of inspectors and bureaucrats he had bested in his long career. They hated him because they belonged to a dying race of bureaucrats and he was their successor. But they had never had him bound so tightly in their red tape as now.

Direct appeal to the foreign commissioners was, of course, useless. They might retreat from their kibitzing, but they would put Earth down as an unfriendly planet of sub-sentient life on which it was not safe to have a space vessel repaired.

"All right, will you do this, then?" said Joe. "Will you convey my respects to the First Administrator and ask him if he would care for a personally conducted tour of my place? Since the repair work is well in hand, I find myself free and would be glad to be at his service."

The advisors gave him uniform, startled glances. Johnson blinked. "I don't see why not," he said, slowly turning over the idea to find the catch. "You're sure the work is in hand? We should like to report that to the President."

"You may assure him that he has nothing to worry about, but a good deal depends upon my friendly relations with the First Administrator. Will you be so kind as to introduce me?"

Suspicious still, he left and returned in a moment with a grotesque, armored hulk.

"Lochneil, the Radalian, First Administrator of the Galactic Union," said Johnson.

The creature extended one of two

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stubby appendages. Two others he kept wrapped around his waist as if he were afraid he'd get his shirt stolen, Joe thought.

"And this is Joe Williams, owner and operator of Joe's Service and Repair—"

Be nice to him, Joe told himself fiercely. This is the guy that can make the field look like another archeological site if he's rubbed the wrong way.

"Glad to know you," said Joe.

"And I," said the Radalian. "Your name is known widely in many galaxies."

The old oil, Joe muttered to himself and smiled appreciatively. "Yes, we get customers from a variety of ports."

"It's comforting to know that our vessel is in such good hands. You are experiencing no unusual difficulty, I trust?"

"Oh, no. Everything's coming along fine. We are old hands at working with strange machinery. We have quite a complete system for analyzing cultural artifacts foreign to our own system."

"That's what I've been told," said Lochneil with interest. "In fact, I had hoped during this good-will tour to investigate your place. Time would not have permitted, but this unfortunate accident has forced the delay upon us. Your offer of which Mr. Johnson spoke is extremely welcome. That is, if you're not too busy, of course."

Was there ever a politician who didn't ask that fool question while he consumed the time and energies of his betters, Joe wondered? The tools to make the tools to make the tools—

It kept ringing through his head like a stupid jingle that had no end or meaning. He had to get a Radalian analogue. He was sure he was right—but if his hunch were a bust—

"We have a carrier that will make it easier than trying to walk in the pressure suit," he offered.

"Not at all. Your gravity is light. I shall enjoy the stroll."

You and who else, Joe thought, glancing towards the dust covered pavement that seemed to be faintly smoking in the heat of mid afternoon. But already the Radalian was striding away.

Joe caught up with him. "That building directly across the field is the hospital. We attempt to give medical attention to all who are sick or injured when they arrive."

"Your depot is extremely far advanced to have such."

He introduced the First Administrator to Dr. Yates, in charge of the hospital. Immediately it was like old home week, and Joe was startled at the ease with which Lochneil conducted himself in Yates' presence. The old doctor was crotchety and hated people asking silly questions.

But he showed Lockneil the pressure suites where natural accommodations of temperature, pressure, and atmosphere could be supplied in an infinite variety of combinations.

For an hour the Administrator pressed him with questions about

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the mechanical and biological functions of the complex hospital—how they operated on creatures that couldn't be depressurized, that had to be continually in atmospheres deadly to Earthmen—

Yates answered them all with obvious pleasure.

A political trick, Joe thought irritably, the ability to appear interested in something about which you didn't give a single, minute damn. But that wasn't the answer, either, he recognized with a start. The First Administrator was actually interested in these things. He acted like a creature with a mind that could absorb such technical information.

He found himself almost pleased with the company of the First Administrator, and chafed irritably against this breach of principle.

They went from there to the great machine shops where Lochneil grilled the official in charge in a way that made old Mortenson enjoy it. The Administrator insisted on operating some of the complex fabricating tools—a twenty-ton shear, an eighty-foot planer, the giant lathes.

Next came the library and museum where vast accumulations of encyclopediac data on a hundred thousand races was stored.

"This is most complete," said the First Administrator in frank awe. "It almost is superior to our Union facilities."

The afternoon was nearly over and the sun was setting with an unembarrassed attempt to re-enact some of the morning's glory. Evening crews had come on, but Lochneil showed no signs of giving up. Joe was hungry and tired. He was afraid the First Administrator would want to read the whole library—or worse, yet, that he would suddenly decide to quit.

They had to make one more stop—just one more.

"Engineering analysis is last," said Joe wearily. "Outside of administration, that about completes what we have here—except the hotel, of course, and you wouldn't care to see that now; I'm sure."

"I must see your analysis section," said Lochneil. "That is almost legendary among starmen."

Joe led him into the building and showed him the files of tapes. "We have better than a hundred thousand analogues of members of foreign races. These have all been gathered since I started the depot when I was young.

"You are aware, of course, of the basis of analogue work. It depends upon the fact that in the brain of each race are typical neural structures. The artifacts of the race are always analogous to portions of these structures. If we have so much as one percent of the data relative to a certain artifact, we can usually determine the rest by interpolation from neural analogues."

"Without the analogue your whole establishment would be virtually helpless, would it not?"

"Right. That's the key that allows the whole place to operate."

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"May I see the Radalian analogues that you have on hand?"

"We have none at all of your race."

"That is most unfortunate—and even more so that we are unable to allow specimens from those of us who are present. Your request was relayed to us, but of course it was not necessary in order to repair the ship."

"Oh, no. We just wanted to increase our files. The repair work was well under way when we made the request."

"Fortunately—otherwise it might have been delayed."

Joe felt the tension of fatigue growing strong within him. "Over here," he said, "are the chambers used for interviewing and analogue taking. Would you care to see what we can do in the way of duplicating your environment?"

"Of course."

Lochneil recited the atmospheric constituents and required pressures and temperatures.

"When the green light glows you may remove your pressure suit. I will be on the other side of this transparent wall."

Would the fool actually do it? Joe was so tired he was almost trembling. He feared his anxiety showed, but Lochneil seemed oblivious to all but the mechanical intricacies of the chamber.

Joe sealed the door and took his place in the interviewers' chair. As the green light flashed Lochneil cautiously opened a panel at the side of his face.

"Very agreeable. Like a spring

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day on my home world."

He stripped off the pressure suit while Joe sat as if paralyzed. The Radalian was a sleek creature who seemed covered with bright green velvet. Great wild eyes shifting at random in the bulging sockets. Scanning vision, Joe thought. He had seen it twice before, but didn't know it was in the Radalians.

The First Administrator strode about, flexing his short and long arms with pleasurable freedom from the suit.

Like a politician strutting around on a platform, Joe thought. But that wasn't right, he knew somehow. Lochneil was of a different cast from the local politicians. He spoke and talked like a man who could perform—

He sat down opposite Joe. "Extremely well done," he said. "I have not seen anything to compare with it in all my travels. I only regret our visit was at the expense of the lives of our crew."

He began fingering the panel at his side. He picked up the helmet used for analogue taking. "This is what, now?" he said.

"That picks up the neural pulses and sends them on to the recorder."

Lochneil gave a pompous *grmmf* and eyed the gadget closely.

Joe fingered the row of controls on the arm of his chair. His hands were sweaty.

If he puts it on, I'll let him have it—

He did—

And Joe did.

He blasted the brain of Lochneil with one quick flash that went deep to extract millions of neural patterns. It was a bitter technique seldom used, but possible. It differed from the ordinary recording in the same way a photograph by intense flash differs from a time picture. And it always knocked the patient out—sometimes seriously.

For a long time Joe just sat there. The great eyes of Lochneil were staring wildly and still scanning slowly—but utterly vacant.

He would be all right—Joe hoped and prayed. But he prayed also for the impossible—that Lochneil might be as completely stupid as the run of the mill politicians in regard to technical matters.

It was already much too late for that, for the First Administrator had displayed many times the comprehension of his Terrestrian kind. And, much as he hated to admit it to himself, Joe liked the man.

He called Yates, who swore at him and left his dinner table. Then he called Litchfield and explained what he had done. The engineer swore, too, and called him a fool for pulling such a stunt.

Then Joe sat down and waited for them to come, almost convinced that their opinions of him were correct.

Yates came first and took the stiff Lochneil away with scarcely a word to Joe. When Litchfield came, Joe was examining the tapes.

"You really put the fat in the fire."

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"I don't know. I couldn't think of anything else."

"You shouldn't think at all after a day like this. Let's get a drink and go home to bed."

"No—we've got to examine these analogues. If I'm right, we can start making tools to make the tools to make . . . oh, hell! we can start tonight."

"And I suppose the First won't even know what hit him?"

"Let's not speak of it now."

They took the tape into the scanning room and placed it in one of the machines. Beside it, they placed data taken from the Radalian plans. Then Joe pressed the button and watched the screen. After a moment he sat back with a sigh. This was it. The Radalian analogue nailed down the molecular spray to the lowest technical level.

They didn't sleep that night, and by morning it was raining. That was appropriate, Joe thought, for the events that would certainly transpire this day.

Art Rawlins had slaved beside them all night and by morning his eyes were as baggy as his grin was wide. "We can make a spray, now," he said. "You watch!"

By dawn Lochneil had still not awakened. Joe went over to the hospital suite while Litchfield and Rawlins got things under way. Joe wanted to be alone with the First Administrator. He didn't want anyone else to have to share the brunt of Lochneil's wrath.

But the First Administrator awoke without wrath or indignation. He sat up so suddenly it almost shocked Joe. Then he grinned ruefully. At least Joe took it for a Radalian grin.

"That was a foolish thing for me to do," said Lochneil. "I didn't even give you time to warn me, did I?"

Joe exhaled—long and deep—and a slow, grim tension began building up anew within him. The Radalian intended to pose as innocent of understanding what had taken place. But Joe knew that was a lie. The questions he had heard yesterday could not have come from one too ignorant to know his analogue had been taken.

Lochneil was still playing a lying political game, and to what purpose Joe could not guess.

"Are you hurt?" he said solicitously. "We're deeply sorry a thing like this should happen. The current—"

"A slight headache is all. I'd like to return to the ship now. I feel hungry."

"Stay right where you are. Breakfast is coming up!"

On Wednesday they had the tools to make the tools to make the tools to make the spray.

On Thursday they had the tools to make the tools to make the spray.

Friday, they had the spray.

In the process, Art Rawlins had filled a hangar fifteen hundred feet long with machinery. He had taken

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advantage of the offer of Johnson to use available government facilities. For two solid days fleets of ships had poured machines and technicians into the place.

On the third day the single piece of equipment required to rebuild the *Martremant* emerged.

The evening shift on Friday began the rebuilding. The ship was moved a considerable distance and shielded heavily—but the junketeers refused to move. Of them all, only Lochneil was on hand to watch the process.

It was wholly automatic, but Joe had the honor of pressing the button to start the process. Inside the ship, a great backing plate had been prepared. In front of it, an intricate scaffolding held the nozzle that sprayed out a great machine, molecule by molecule.

Simultaneously, on each floor, the process went on, building the units that would drive the ship at third-order velocities.

And Joe had not yet solved the lie of Lochneil. But he was about to, he thought. It was now or never.

He fed the heavy piles of matrix plates into the scanning chambers of the molecular spray. While Lochneil—and only Lochneil—was looking, he switched a pair of matrices.

He stepped back then, absently watching the functioning of the machine. On tube faces, they could watch the building as it proceeded inside the ship. Joe was aware of Lochneil's eyes upon him. The great scanning eyes of the First Administrator were spinning back and forth like mad radar beams.

At last, with a cry of dismay, the Radalian leaped for the controls of the machine just as the scanning of the erroneous matrix began.

He cut the power and gestured helplessly towards the matrix.

"I thought . . . it seemed . . . are you sure it's working all right?"

"Now how about the full story?" said Joe. "You've been pulling our legs ever since you came here. Why?

"You knew perfectly well how the molecular spray was to be built. You could have told us, but you played dumb. Then you deliberately sat down in the analogue chair and *gave* me the analogue I had tried so hard to get. There must be a reason, and even if you are First Administrator, it ought to be a good one."

Lochneil smiled slowly and turned to the controls. He changed the matrix and started the machine again. Then he faced Joe.

"I was quite sure you never would get the *Martremant* repaired in any reasonable time without the analogue. That's why I gave it to you. You see, I happen to be the inventor of the spray process."

Joe swallowed hard. "You . . . the spray—"

"We came here for the prime purpose of getting information first hand from your people about your people. The conferences and dinners and polite exchanges we were subjected to in your Capitol seemed like a deliberate barrier to prevent that. So we had planned a secret mission to accomplish what a straightfor-

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ward visit seemed unable to do.

"Then, suddenly, the accident made it possible. Our kibitzing, as you called it, was quite deliberate. We wanted to observe you in natural circumstances. We wanted to observe your attempts to solve the problem without knowing you were being given the molecular spray. Your results were admirable."

"But why all this?" said Joe. "It still makes no sense. You—the spray designer, and First Administrator. We haven't a single being on our whole planet who could occupy correspondingly similar positions."

"I know," said Lochneil. "That is the tragedy of your people. We have studied and marveled over your organization since you entered the Union. You will not be flattered, I'm sure, to know that among the sociologists of more advanced civilizations you are classified as 'political primitives.' Hundreds of theses have been written to describe and explain how a culture can advance in such a lopsided manner as yours.

"Good government is simply good living, and we are taught how to live with one another. Therefore, it is hardly startling among us that I, the inventor of the spray, should also serve a term as First Administrator. The implications of your term 'political' do not exist among us."

"Then there is no intention of choosing an Earthman for First Administrator?" said Joe.

"On the contrary, we are seriously considering the appointment. It would give you considerable political confidence as a people.

"We have watched with pleasure your progress since entering the Union. Your bureaucracy is dying at an increasing rate, and we should like to offer assistance in its replacement. There is in your language a term, I believe, that expresses somewhat the situation — wheels within wheels."

Joe got it then. The faint implications that had been present in the Lochneil analogue.

Wheels within wheels—

Concentric coteries of increasingly tight and advanced organizations within the vast Galactic Union. Primitive worlds, such as Earth, were allowed to believe there was only a loose federation. But they were thinking now of inviting Earth to join one of the inner circles—

"I hope if you choose an Earthman you will get a man who can beat a politician at his own game," said Joe.

"I shall. I surely shall. He will be handpicked and trained for the position, and I have a positive recommendation already to make as soon as we return to Administration Central.

"It has been a pleasure to know you and watch you at work. Exhausting all lesser alternatives, you resorted to extremities only when necessary. You operate according to correct political principles, Mr. Williams. In fact, I would say you are an excellent politician."

THE END

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FOLLOWER

BY ERIC FRANK RUSSELL

***One individual** may follow another for revenge, for gain or for a number of other reasons. But the one motivation that will* not *give up yields no profit whatever . . .*

Illustrated by Miller

Haifid was the first to find the alien ship. He hurried down the hillside path leading toward the lake and happened to look into a wayside dell and saw the vessel. It was small, shiny and flattish with short pipes protruding all around its rim.

The sight caused his scalp to twitch; it affected him almost like an electric shock. He stopped in his tracks, had another look to establish the verity of the incredible. The thing was there all right, reposing comfortably in the dell. Definitely it was not of this world and therefore must be of some other.

Though new to his experience ships of space were not strange to his mind. Indeed, among his kind the legends concerning them were so old that they had become distorted in the telling. On the basis of these ancient tales he had imagined a spaceship as being the size of a mountain range, a monstrous fabrication glowing with a thousand lighted ports. In such mighty creations, it was said, had the Elder Race long roamed around this part of the cosmos until one and all had gone to places unknown.

Compared with those colossal cylinders of the dim and distant past this contraption in the dell seemed tiny, unimpressive. But the significance of its arrival was out of all propotion to its size. As an event, it was tremendous to an extent that thrilled his body through and through.

His gait as he moved nearer to it was slow, deliberate, almost processional. Caution was not the cause, but sheer reverence. It might well be that for the first time in the twenty thousand years since they went away an Elder had returned. Even if there was only one Elder, a little one, it meant that contact had been regained. Once more this world would be blessed by the presence of the gods.

Advancing foot by foot in manner suitable to the solemnity of this immense moment, Haifid thought of the effect the news would have upon his people. According to the old time stories their intimacy with the Elders had verged upon symbiosis, a mutual

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satisfying between psyche and psyche. That thee-and-me existence had endured so long and become so well established that its loss could still be felt and expressed itself in a hungry yearning passed on from generation to generation like the pain of an ancestral memory.

Now the waiting-time was over. He, Haifid, blessed witness of the second coming, would be the bearer of glad tidings to the world. How wonderful it is to be the bearer of glad tidings!

At that point, twenty yards from the silent ship, his hopes were dashed, his dreams shattered. A long, green speckled thing, wriggly and four-eyed, appeared over the farther rim from where it had been concealed upon the ground, scuttled hastily across the top and dived for safety through a hole in the dome. It made no audible sound but it was projecting telepathic pleas precisely upon Haifid's band.

"I apologize! I apologize!"

Haifid stopped, disappointed, disheartened and somewhat disgruntled. The green thing now cowering inside its ship resembled nothing he'd ever seen. There were many things it might be and one it was not—it was not an Elder. The Elders had been preserved in mind-pictures passed from generation to generation. They were not green, wriggly or four-eyed. Neither were they timid and apologetic. Quite the con-

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trary—they were gods who looked like gods, behaved like gods.

The green thing was now protesting: "I could not help it. The landing was involuntary. It was no fault of mine. I apologize!"

Moodily staying put, Haifid pondered the situation. When one falls from the heights one flops to the depths. He felt too low to be enthusiastic about the green thing. It was not an Elder, not a god. Neither was it a humble messenger of the gods. They would never have chosen a creature so outlandish and craven. His own kind had functioned far better in this respect, for in bygone days they had performed god-ordained tasks swiftly, eagerly, with all the bumptious zest of those who enjoyed the confidence of the gods.

"I had no choice. The landing was involuntary. Do you hear me?"

"I hear you," admitted Haifid rather surlily. He projected the answer without much mental drive, little caring whether the other got it or not.

The green thing did get it. Possibly its receptive apparatus was efficient above the ordinary just as some have hearing abnormally acute. Or perhaps its manifest anxiety impelled it to strain for a response, any sort of a response, even a telepathic whisper. Anyway, it came back at him with a thankful babble of mental impulse but took the precaution of remaining within the ship.

"The Trans-Ten space liner was wrecked. A superswift island of rock ripped it open from prow to stern. Everyone died, everyone—but me." A pause as the green thing brooded over the tragedy. "I was lucky. I was inside one of the lifeboats checking its emergency supplies when the crash hurled it clear. I made for this planet."

Haifid shot back a sharp and nasty, "Why?"

The other reacted agitatedly. "I could do nothing else. Three-quarters of the fuel sticks had been counted and placed upon the deck. All were lost. I was tossed out with the remaining quarter. They were not sufficient. My range was limited. There was no world within reach but this one. So I have come here and I have apologized." Hesitation followed by a queer, distorted mumbling, then, "For eons we have taken care not to trespass within the Khar's celestial sector, not in any way to offend the Khar, and now that circumstances beyond my—"

He ceased as he sensed the strength of Haifid's sudden boost. Along with the talk had come a mind-picture of the Khars referred to, and with it Haifid's gloom had vanished in a burst of brilliant light.

Racing to the vessel's rim, his heart pounding wildly, Haifid projected his urgent order with all the power he could command.

"Come out! Come out!"

"For what? For death?"

"For life!" yelled Haifid. "Life for you and me!"

A solemn circle of village oldsters squatted around the log fire,

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listened to the immensely excited Haifid, eyed the green thing. The latter had no comprehensible name so they called him Four-eyes and left it at that.

Four-eyes wore a small metal contraption clamped over the hole in the back of his neck and explained that it had something to do with this world's air. This seemed silly, as it was obvious to one and all that there was nothing the matter with the air, but they were too polite to mention the fact.

Finishing his speech, Haifid tossed a thin metal rod on the ground. "So he needs seventy sticks like these to get home."

"Does he ride upon sticks like a witch?" asked Norsum, the most aged of the circle.

"They are automatically fed one at a time into my engine where they dissolve and give forth power," explained Four-eyes as one would to a child.

"A disintegratable liquid would be more economical and easier to control," remarked Norsum blandly.

Four-eyes did a second take at him, spoke with a note of respect. "That is correct—but we have failed to find a liquid comparable with that used by the Khar. They are far ahead of us."

"As is natural and proper," opined Norsum. "They are gods—*our* gods."

"Then if I am caught you can intercede for me," said Four-eyes, showing, praiseworthy opportunism.

"I fail to see the necessity. Why do you fear them so much?"

"It is part of history," explained Four-eyes. "In the long, long ago these Khars scouted world upon world until they reached our sector where we were strong and recognized no equals. My forebears, who were foolish, rejected their overtures of friendship, treated them as enemies and harried them at every opportunity."

"Go on," encouraged Norsum.

"The Khars did not retaliate. They kept their distance, their dignity and their peace. That encouraged the foolish in their folly. In due time they mounted a major attack which made chaos of a Khar-world."

A strange murmur ran around the circle, a half-suppressed note of horror such as true believers might utter when a holy place is defiled.

Four-eyes fidgeted uneasily, registered a pathetic sort of guilt. "For the first and only time the Khars hit back. One blow—just one blow. It was terrible, terrible!" He filmed all his eyes and shuddered. "It left us barely able to survive. It reduced us to such impotence that it has taken us scores of centuries to climb back to our present stage."

"A sword cuts both ways," reminded Norsum. "An arrow flies no farther from me to you than from you to me. It should be a lesson to your kind."

"It was—and is! We have risen to new strength by keeping clear of the Khars. From birth to death that is our constant thought—avoid the Khars. Carelessness in this respect

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has become a crime meriting severe punishment. Indeed, I may yet suffer for landing here even though I could not help it."

"That is both stupid and unjust," put in Haifid. "The Elders left this planet some twenty thousand years ago. There are none here, not one."

"We could not assume that fact," Four-eyes pointed out. "Anyway, this world is recorded on our graphs as within the Khar sphere of influence and therefore forbidden." A suspicious thought struck him, he studied their faces, glanced uneasily around and added, "If these Khars are your gods, as you affirm, why are they not here? I do not think much of gods who desert their own."

Norsum resented that. He said emphatically, "They did not desert us. They were mighty beyond belief. They conquered the heavens, found other worlds more suitable for their might. They tried to take us with them—and failed."

"Gods—who fail!" commented Four-eyes, refueling his heresy.

"The fault was ours," Norsum told him heavily. "We could not stand the trip. The legends do not give full details but say that space journeys gave us sickness, hysteria and death." He brooded over that a little while, continued, "Of course, that was many eons ago. We have changed since. We have altered vastly. There are some among us"—he shot a look at Haifid— "who think we might make it without difficulty today."

Another oldster named Ermen chipped in with, "The Elders went away with deep regret." He voiced it like one reciting an oft-told tale. "Some of their young ones wept at the parting. A few of the old ones refused to go and stayed among us until they died. The last of the ancients—and they were ours."

"Hah!" said Four-eyes. "Gods who die. Gods should be immortal."

"Why?" asked Norsum.

That tangled him. Four-eyes sought around for one adequate reason, failed to find it, gave it up. He had no god of his own other than one kept in a bottle and renewed at frequent intervals. A shortage of fuel sticks kept him from communion even with that replaceable deity. He gave the sample stick a kick which rolled it nearer the fire.

Eying the stick speculatively, Norsum sighed and said: "You are as much ahead of us as the Elders are ahead of you. We shall not be able to build a space vessel for centuries to come, if ever."

"I differ," interjected Haifid, who made a pastime of differing,

Taking no notice, Norsum went on, "We do not work metals ourselves but there are other more dexterous life-forms here who do so under our direction. We are not entirely without ability, you see? So we have metals of many kinds. We will see whether it is possible to match your fuel stick. If so, you may go."

"At a price," added Haifid, leaning forward and gazing eagerly at Four-eyes.

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Turning on him, Norsum snapped, "You are young, impetuous and have yet to learn to bide your time."

"I found him," insisted Haifid, showing poor respect for age. "Finders keepers!"

After thirty weeks there were fuel sticks. They were of heavy alloy imported from the south. In no way similar to the alien sample, nevertheless they functioned for reasons beyond anyone's ability to explain. Four-eyes had tested sticks of all sorts and had experienced so many failures that he had long given up hope. When this new lot magically set his tubes roaring he created a dozen impromptu gods within his mind and thanked each one individually.

Counting the pile on the ground, Norsum said: "There you are—exactly seventy. Are you sure they will be sufficient?"

"More than enough," conceded Four-eyes "They blast harder."

"Then pay for them," suggested Haifid with appalling bluntness. He ate the little ship with his eyes.

"How can I pay? I possess nothing."

"The price is free passage for one," Haifid told him.

Norsum put in, "He is afflicted with an obsession. He is mad."

"Madder than you know," indorsed Four-eyes. "He would not tolerate my home-world even if he could live on it without an air filter."

"I care nothing for your home-world," said Haifid. "I want transport to one of the Elders' worlds—any one, I don't care which."

Four-eyes shivered all over and uttered an emphatic, "Never! Never!"

"Gratitude," commented Haifid, looking at Norsum. He planted a possessive foot on the pile of metal sticks. "No passage, no fuel."

"I dare not. The Khar will destroy me on sight."

"The colossus does not bother to swat a solitary fly," Haifid pointed out. "Anyway, on your own showing you're scores of centuries behind the times. The war ended a hundred or perhaps a thousand of your generations back. The war-mentality is all on your side. It is you who has the obsession, you who are mad."

"I think he's got something there though it could have been expressed more diplomatically," Norsum told Four-eyes. Then added, "All the same, he's taking an unfair advantage of you."

Four-eyes said doubtfully, "How do *you* look at this proposition?"

Mulling it over, Norsum replied, "I would like you to refuse him and thus give him a much-needed lesson in patience. At the same time, I would like you to take him and thus get him out of my sight. There are moments when he irritates me."

Haifid grinned at this demonstration of how to sit both sides of the fence, and pressed home with, "Besides, you need not land. You can drop me and continue on your way."

"I can do that," admitted Four-eyes. "I have an antigravity belt.

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But—"

"Then it is settled." Haifid took his foot off the sticks.

"It is sheer insanity. The Khar—"

"Forget the Khar. They are not your gods—they are mine!"

"Oh, well, all right," agreed Four-eyes, only one tenth convinced but seeing no way out. "I will take you much against my better judgment."

It having come to that, Norsum also made up his mind. "I am glad. If he gets there it will prove how greatly we have changed. The Elders will not have forgotten us any more than we have forgotten them. They will be at one with us again." His shrewd old eyes rested on the green alien. "And our blessedness will be equaled by yours for you will have been the maker of peace between your kind and the Elders."

"Maybe," said Four-eyes, wary of the Khar and skeptical of his own ability to change the shape of trans-cosmic relations. Climbing upon his tiny vessel's dome, he started loading the fuel sticks tossed up to him one by one by Haifid. "And maybe not."

An Elder world was in sight, greenly brilliant, by the time Haifid recovered from his tenth vomiting sickness and his second successive coma. The vision of the oncoming planet perked him up tremendously, giving him fresh life. On the other hand, Four-eyes began to wilt, look sick.

"This is the danger spot." Four-eyes strove to watch all screens simultaneously. "You have no idea of the effort required to approach it. I am struggling to subdue centuries of conditioning. Every fiber of my being screams 'Beware!' What a price you demanded of me!"

"You could easily have killed me when I was too ill to care," remarked Haifid, studying him. "You could have rid yourself of your burden and obligation together. But you did not. Why?"

"I am homing out of the Khar sector, risking capture by the Khars. Alone, what might I suffer at their hands? With you, to talk them out of it—" His mental impulses tailed off. He continued to watch all screens for a Khar ship in the vicinity. It is comforting to have faith in one's screens.

"You will be alone after I am dropped," Haifid observed.

"Not for long. This is their last outpost world. Beyond it lies our own sector—and home."

"As for talking them out of anything," Haifid mused, "the legends say that we never did talk with them. The legends are strangely vague on that point. We were not telepathic in those days. We were purely vocal. The Elders were vocal also, but not after our fashion. They may have been telepathic, too. We have no data on that."

"Then how did you communicate with them?" asked Four-eyes, keeping up the conversation but more anxious than interested.

"I don't know. Norsum doesn't know. Nobody knows. The legends say only that we were at one with

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the gods, they understood us and we understood them. No more than that."

"Humph!" Four-eyes shrugged it off. "It is a mystery to me. I cannot conceive how it is possible that you and—" He ceased abruptly, half-arose from his control seat. His eyes were large and protruding. "Look! It is upon us—and the screens gave no warning. In the name of the Black Planet!"

Haifid looked. An opaque but shining bubble loomed large in the armorglass port. It was swinging closer, about to make contact. No ports were visible upon its smooth surface, no fire spurted from it. The green world for which they had been making hung far behind it, almost obscured.

"A ship of some new type. It cannot be other than a Khar scout. Nobody else would dare—" Four-eyes snatched frantically at various controls. His tiny vessel looped, darted sidewise. The bubble followed with ease. "Space preserve me!"

There came a slight jar as the bubble touched. It clung despite the other's wildest gyrations. Losing heart, Four-eyes abandoned his controls, waited for death. He seemed to have become unconscious of Haifid's presence so deeply was he buried in contemplation of his fate.

The dome trap began to unwind itself in response to operation from outside. It squeaked steadily as it turned. The sound had no effect whatever upon the green one biding his doom.

Haifid stood immediately below the trap watching it twist bit by bit. The blood was pounding in his veins. Thrills of supreme excitement ran up and down his spine. A new strength boiled within him and an intense longing.

It opened. A commanding mental voice ordered, "Come!" The voice was not across his own band but there was an overlap sufficient for him to hear and understand.

Disregarding Four-eyes, intent only upon the glorious culmination, Haifid obeyed the voice, leaped through the trap and right into the bubble.

For a long, long minute of extreme ecstasy he stood gazing upon the god within the bubble, drinking him in, worshiping him. During this time he was conscious of many things: the unexpected transparency of the bubble from the inside; the rewinding of the trap behind him; the breakaway and thankful escape of Four-eyes' little ship; the vibrationless plunge of the bubble toward the outpost world. But all these were minor matters beside the wonder of the god.

At last, greatly daring, he addressed him by his god-name, saying, "You are Man?"

"Yes."

"And you remember?"

"We have never forgotten," assured the other. Bending, he pulled gently at Haifid's ears. "I am Man—and you are Dog!"

THE END

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THE GENERAL ADAPTATION SYNDROME

BY JOSEPH A. WINTER, M. D.

***Recent work** indicates that the human — and mammalian — body reacts to danger with a sort of "General Alarm . . . Battle Stations! . . . Prepare for Emergency Status" reaction. And that, in long emergencies, the crew grows weary, then exhausted . . .*

Have you ever tried to figure out a good definition of the word "life"? Not so easy, is it? The dictionary doesn't help much, either; you come away with the idea that life is not death—true, but not too helpful. If you consult a biology text, you usually find life defined as that group of processes which includes metabolism, reproduction, growth and the ability to adapt to the external environment.

That isn't too good a definition, either. Grampa Jones, age eighty-three, certainly doesn't grow, in the usual sense of the word, and it is highly doubtful that he is capable of reproduction, yet he's alive.

There is one very important part to that definition, however — the ability to adapt to the external environment. Maybe that ability isn't life, but it's definitely living. In fact we can, without indulging in oversimplification, say that all living can be expressed by the formula stimulus-reaction.

The medical profession has been working on that formula for years. For a long time they were primarily interested in the reaction. Some of the earliest medical records, like the Ebers papyrus, and the writings of the ancient Greeks, are beautiful examples of descriptions of reactions. A soldier gets a blow on the head; he develops loss of consciousness, a rapid pulse, vomiting, headache, visual disturbances, et cetera—a reaction called "concussion." Or an innocent bystander gets cut with a

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knife; in a few days the site of the wound shows the signs of *tumor, rubor, calor, dolor et function läesa.* If you don't remember your Latin, that means swelling, redness, increased local temperature, pain and loss of function—and it's a good description of the reaction called "inflammation."

Yes, the ancients did a pretty good job studying reactions. They weren't so hot at figuring out some of the stimuli which caused the reaction. When the stimulus was an obvious event like a blow on the head or a knife wound, they didn't make any glaring errors, but they had some awfully queer ideas about the causation of disease. For example, they thought that, a person who worried too much about his health had something wrong with his spleen. The spleen is located under the cartilages of the ribs on the left side, or in Greek terminology, in the hypochondrium. And so a worry wart, a hypochondriac, is a gent whose spleen is not firing on all cylinders.

The first really scientific investigation of the stimulus side of the reaction was done by Pasteur when he discovered that bacterial action could cause disease. His work, once it gained acceptance, was carried to great and enthusiastic lengths by those who tried to follow in his footsteps. For a while it was thought that all disease, except that caused by obvious physical trauma, was bacterial in origin.

The next great medical enthusiasm followed the discovery of vitamins. It took a little while longer for people to realize that the *absence* of something could cause disease, as well as the *presence* of a foreign invader. By now, of course, it's well accepted that a deficiency in certain vitamins can cause disease.

That, incidentally, is a delightfully simple concept which makes treatment so simple that any high-grade moron who can afford a bottle of vitamin capsules can cure himself. You have a deficiency of a certain substance in your diet and, as a result, you have a disease; all you have to do is take some of that substance in which you are deficient and, lo and behold, the disease is cured.

Sounds good—but it isn't necessarily so. Some of our less credulous investigators have found that giving large doses of vitamin B complex to a man with pellagra will kill him. Apparently he had adjusted himself fairly well to his vitamin deficiency, although his adjustment was in itself a deviation from good health. In other words, he was adjusted to having a deficiency. When this deficiency was suddenly treated, he could no longer adjust to it—and it was silver handles and slow music.

To get back on the track again—in the study of the formula stimulus-reaction, the medical profession has done a pretty good job of digging into the first and last elements. Now, however, we're starting to study the process whereby a stimulus is converted into a reaction.

The process usually called "adapta-

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tion," is a complex one. Even in its simplest form, the reflex, it's so complex that we hardly understand it at all. The doctor tells you to cross your legs, then he strikes the patellar tendon with his little rubber mallet. Your knee jerks — apparently very simple. But the nervous pathways which have to be traversed for that reflex jerk to occur are far from simple, and when you get into your other responses to this stimulus, such as asking yourself the question, "What's he doing that for?" it really gets involved.

Adaptation is the name given to the response of the body-as-a-whole to a given stimulus. While the entire body takes part in the response, we can point to two mechanisms by which adaptation occurs, the nervous system and the glandular system. Please note the terminology in that last sentence. We can *point out* these mechanisms—but we can't separate them in their function. We can't have a nervous system functioning alone, we can't have a glandular system functioning without a nervous system, we can't have either system without a body. Remember then, that in speaking about these two systems the separation is purely a verbal one, and that in their functioning they are inseparable.

Having thus paid our respects to Korzybski, let's get an example of the integrated working of the nervous and glandular system. You are bending over and suddenly you feel a kick in that part of your body which is the usual target for a kick. What happens? First, the sensory nerves carry the report to your brain that a painful stimulus has been applied to your *sitzfleisch*. Nerve impulses circulate throughout your cortex and you interpret this stimulus as a kick. The thalamus enters into the reaction and decides that this painful stimulus is an emergency, so more nervous impulses are sent to the medulla of the adrenal glands. The adrenals pour out epinephrine and this, circulating through the blood stream to all parts of the body, produces more reactions. This hormone causes your blood pressure to rise, your heart rate to increase, your bronchial tubes to dilate; the blood vessels along your intestinal tract constrict, your blood sugar rises and you are now prepared to cope with this emergency either by running or fighting.

By this time you have straightened up and turned around—more nervous elements working — and have identified your assailant. You see that it's one of your best friends, who has the sort of sense of humor which makes a kick in the *derriere* an excruciatingly funny event. You realize that there is no necessity either to run or fight; your anger evaporates and you laugh and try to ignore the whole thing.

This is the barest outline, of course, of what went on in your body between the stimulus and the reaction. We don't even mention the effects of epinephrine on the functioning of the other endocrine glands, or

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the association of this kick with other kicks in your past life.

Superficial as this example is, it points out that you don't get angry with just your gluteal region—you get angry with your whole body. And the parts of the body that are doing most of the work are the nervous sytsem and the glandular system.

In this article we'll have to skip the discussion of the nervous system and how it functions. It's a fascinating subject, and one in which there are some very new and startling discoveries. Instead we'll talk on a subject about which we're equally ignorant —the glandular system.

One of the most prolific contributors of valuable knowledge about endocrine function is Dr. Hans Selye of the University of Montreal. It was he who first propounded the hypothesis known as the general adaptation syndrome, which, in the opinion of many scientists, is one of the major examples of the synthesis of related data.

Dr. Selye defines the general adaptation syndrome as "the sum of all nonspecific, systemic reactions of the body which ensue upon long continued exposure to stress." Perhaps we should take time out for a few definitions for those of you who were fortunate enough to stay out of medical school. That word "syndrome" means a group of symptoms occurring together. The word "nonspecific" points out that these reactions are due to a variety of agents; development of immunity to a certain strain of bacteria would *not* be a nonspecific reaction.

The formulation of this hypothesis came as a result of observations on laboratory animals and humans. It was noticed that a great variety of noxious agents and injurious events produced the same response. Shock—so-called surgical shock, that is—muscular exercise, infectious diseases, hemorrhage, severe emotional stress, exposure to cold, reduced amount of oxygen, burns—including sunburn—bacterial toxins, exposure to radioactive emanations and a long list of drugs—all these cause a similar response pattern.

What is believed to be the most important part of this response pattern is seen in the adrenal cortex—the outer portion of this pair of glands. We see here an enlargement of the cells and changes in their appearance. The changes are slight, but definite and consistent. Of course the other glands of internal secretion show changes too; most of them tend to become smaller.

Numerous other changes occur in body function quite constantly in this pattern of response to injurious stimuli: the blood pressure first rises, then falls, then rises to above normal height again. The bleeding and clotting time of the blood is shortened. The blood sugar rises, then falls, and finally reaches supernormal heights again. The level of chlorides in the blood first decreases, then rises to an abnormally high level. Numerous other changes are seen also; but a tabulation of all of them would be only of academic interest.

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All this, and many more changes besides, occur when an animal tries to adapt itself to a noxious stimulus. If the adaptation is successful and the animal is able to get back to good health, the changes regress. If the stimulus persists, then the adaptive processes go on until they are successful or until failure occurs. When the animal finally dies, the cause of death is not so much the agent which started the reaction as it is the reaction itself. In other words, the animal kills itself by over-adaptation.

As an example of that, consider the case of Dudley Diddle. He had the sort of job which required a lot of drive, the ability to make split-second decisions, the possession of vast stores of energy. He adapted himself to this situation by an elevated blood pressure—he had plenty of steam in the boiler at all times. After having had high blood pressure for a while, he had a stroke and died. It wasn't the job which killed him—it was his method of adaptation to the job. Sounds like hair-splitting—but there are certain implications to this attitude when it comes to the treatment of such situations, as we'll see later.

O.K.; we've seen that various non-specific stimuli cause certain changes in the body. Selye went a step beyond this. He injected large doses of one of the hormones of the adrenal cortex and produced the same changes. This hormone, desoxycorticosterone acetate – DOCA for short—would, under controlled conditions, give the same sort of response in blood pressure, mineral metabolism and in the terminal organic changes.

They also found something else which gave the same results as DOCA; when they administered an extract of the anterior portion of the pituitary gland—bang, some changes. This extract was presumed to contain the adrenocorticotrophic hormone—ACTH to you—which is the chemical messenger sent out by the pituitary gland, telling the adrenal cortex to go to work.

Now, what does all this mean? Simply this: whenever you drink formaldehyde or get sunburned or have a severe emotional shock or are exposed to any one of a number of noxious stimuli, a certain mechanism starts functioning. The most important part of the mechanism is the adrenal cortex, elaborating its secretion of DOCA. It actually doesn't seem to make much difference to the body in general whether this DOCA appears as a result of pituitary stimulation, as a result of being administered directly, or as an end result of being subjected to a harmful stimulus.

This concept opens up a great new avenue of treatment—and we can certainly stand that. The present day healers are no longer so naive as to treat the knife which made the wound, as they used to do in primitive times. But they still are mainly preoccupied with working on the reaction. If you're nervous, they give you phenobarbital. If you ache in

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the back of your neck, you get aspirin and massage. If your heart goes flip-flop whenever you get excited, you get digitalis to slow down the heart rate. But endocrinology teaches us that we don't have to treat symptoms; we can influence the abnormally functioning glandular system which is causing all these complaints and get rid of them all at one stroke.

It's necessary now to retrace our footsteps a little and consider some of the things which were deliberately omitted. Take that business of the terminal organic changes which occur after a high blood level of DOCA. By giving DOCA to rats and other experimental animals, Selye and his co-workers were able to produce some very interesting end-results, results which, if seen in a human, would be spoken of as actual disease. For instance, some of the rats got arthritis—typical rheumatoid arthritis, with inflamed swollen joints and deposition of new bone around the joint spaces. Other rats developed nephrosclerosis, which is a condition of the kidney similar to Bright's disease of human beings. Other animals got ulcers of the stomach and intestines—the same sort of ulcer seen in men whose work subjects them to worrisome stresses. Other animals showed up with changes in their intestinal tracts similar to the appendicitis of humans.

A good many of us, when told of animal experiments, put up an immediate objection. "I'm no rat. Just because a rat gets arthritis doesn't mean to say that I will."

Well, you're right—to a certain extent. You're *Homo sapiens,* not *Rattus norvegicus;* but there is a great similarity in the functionings of your bodies, so much so that animal experimentation gives us strong presumptive evidence of similar effects in humans under similar circumstances.

That last phrase—under similar circumstances—is the stumbling block. In experiments, certain factors are rigidly controlled. For example, the rats are kept on a definite, unchanging diet. They don't go out on Saturday nights and get a snoot full, nor do they stop in at the corner drugstore for a malted. When their diets are changed, they react differently to DOCA; for example, an increase in their sodium chloride intake makes them more sensitive, while an increase in carbohydrate foods make them less sensitive to the harmful effects of this hormone.

In other words, diet is another factor in adaptation, and a factor which is so variable and difficult to control in humans that we tend to disregard it as being too complex for analysis. Diet is hard to control; but we can control the endocrine system with relative ease.

You might, incidentally, wonder if it wouldn't be a good idea to do away with the adrenals, if the secretions cause so much trouble. Unfortunately, we can't. The adrenal glands are necessary to life; remove them and the adrenalectomized animal dies within a few days. They are

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necessary to adaptation and the fact that they fail to work properly doesn't mean that you can dispense with them. When your car gets out of time, do you throw your distributor away? Moreover, as was mentioned before, their failure is not so much in being inefficient, as it is in being too efficient. Over-adaptation —that is, over-secretion of DOCA— is the cause of the damage.

Well, what are we going to do about it? Right now, there isn't very much we can do—we don't know enough. A few things, perhaps—we know that a sufficient supply of sex hormone prevents the adrenals from going hog wild. If rats are given both sex hormones and DOCA they don't get arthritis. And we know that diet has a lot to do with the way the adrenals function and are able to function. And we have a sneaking suspicion that certain other less obvious influences can affect us; one example is the effect of noises on the human organism.

The interesting part to us science-fictioneers is that there are many highly interesting—and equally speculative—ramifications to this concept. Once we see that changes in the functioning of the endocrine system can alter all of our body responses, new vistas of treatment open up before us and we can see the possibility of understanding ourselves better. For example, schizophrenics have a pattern of glandular function which deviates from the norm. Their adrenals don't work as ours do—assuming, of course, that you and I can be interested in science fiction and still retain our sanity. Maybe in the future, by the proper administration of hormones we can cure schizophrenia, or at least be able to recognize it early enough to prevent it.

Maybe coronary occlusion, which kills so many able men at the peak of their careers, is a result of faulty adaptation. Keeping in proper hormonal balance might prevent untimely death.

Perhaps—but I should let you do the speculating. It should be sufficient to point out that the hypothesis of the general adaptation syndrome gives us a new angle of attack on the ills of humanity. It's like the situation where a car goes off the road and crashes into a house. Until recently, the medical profession has been more interested in repairing the damage to the house; now we have the possibility of treating the car, so it doesn't go out of control.

We still have a lot to learn, of course. That's what makes it fun. We know where our ignorance lies, and can start searching for ways to eliminate it. Unlike Alexander, we don't have to complain that there are no new worlds to conquer. We have those new worlds—right inside our skins.

THE END

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SCIENCE FOR ART'S SAKE

BY J. J. COUPLING

***When a** physical scientist, who is also an artist of considerable ability in his own right, makes a genuine and serious effort to determine what, in precisely expressed terms, Art is . . . the result is extremely intriguing to both scientist and artist!*

It would seem odd if mathematics had nothing to contribute to the arts, and yet I think that its contribution has been small. Many mathematicians have constructed designs in the forms of well or little known mathematical curves. These are often pleasing but never very surprising. An eminent mathematician, Birkhoff, wrote a book on aesthetic measure. To me personally the work seems doubtfully founded in that it looks rather at pieces of porcelain and scraps of paper than at the human beings who appreciate them. As far as creation goes we need not argue about the methods. The author gives an example to illustrate the application of the rules derived in writing a poem. We see at once that a second-rate poet is, as an artist, still far ahead of a very eminent mathematician. A later author, J. Schillinger, claims a share of the merit of "Porgy and Bess" for his mathematical system of composition. A skeptic might argue that a composer of genius can make a good thing of anything. Certainly, when mathematics is used merely as a sort of guide or crutch, it is hard to apportion credit between the mathematics and the user.

Despite the record, one is inclined to believe that mathematics may be of some real use in connection with the arts, and that it is perhaps through a combination of over-expectancy and misdirection that past users of mathematics have had such dubious success.

The matter of over-expectancy is, I think, very obvious. Scientists do not dash off books giving a world system of science after a few years

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of work, or even after many. The typical major contribution of the mathematician or physicist is a short paper presenting some new law or proof. Even though a law or theorem may be very general in its implications and applications, the implications and applications are commonly worked out over a good many years by a good many people. It is true that scientific books of great scope are written, but these include much which summarizes the sound work of others, and even these books of wide scope are exceedingly narrow compared, for instance, with a philosophical system, of aesthetics or of anything else.

On the contrary, those who wish to apply mathematics to aesthetics seem to feel that they must conquer much at once, and that they must defend to the death their conquests. A combination of attempted universality and solemnity sets a poor atmosphere for investigation.

One should be happy to achieve anything new through mathematics, however narrow the achievement may be. While great art may sometimes be solemn, there is also an art to escape and amusement. Is it too frivolous to suggest that one might enjoy mathematically produced doubletalk, even if he cannot have a mathematically produced "Paradise Lost"? The first airplane was none the less wonderful because it could not imitate the grace and endurance of a bird. The automobile is useful even though it cannot think nor climb a tree. I believe that the mathematical aesthetician must be content with what he can get and must not ask an infant science to duplicate the achievements of an old race.

This leads at once to the question of aim in applying mathematics to the arts. In the past, the machine has not duplicated the complex abilities of man even in any one narrow field, but rather has done a specific task better than man, or has done something beyond man's power. What, then, could be done by means of mathematics and, perhaps, modern computing machinery, that unaided man finds difficult or impossible? The most common answer is that mathematics can put a pattern into art. From this we have curves and sequences of numbers as a basis for design and music. But, perhaps mathematicians can best be used for quite the opposite purpose, that of taking some of the pattern out of art.

It is clear that one thing which human beings find it almost impossible to do is to behave unpredictably in the simple matters of life. One may, for instance, ask a man to produce a random sequence of digits. Statistical studies of such sequences have shown that they are anything but random; it is beyond human power to write down a sequence of numbers which are not in some manner weighted or connected. Tables of random numbers—there are such tables—must be made up by other means and with great care.

In the same way, it is easy to agree that a truly bad poet never, or

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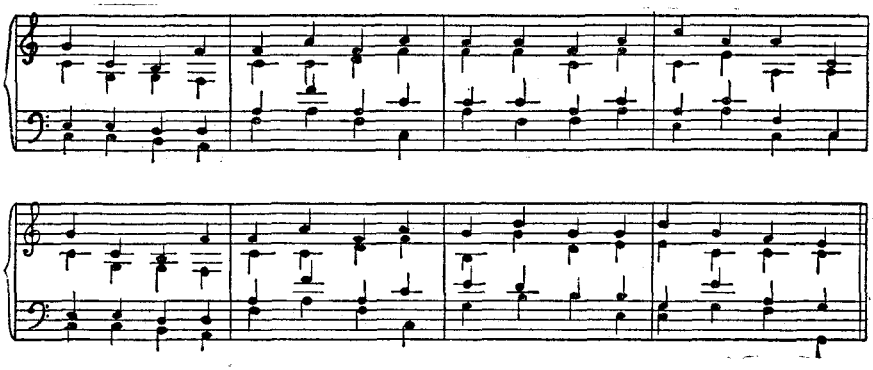
RANDOM I



almost never, writes a good line. One might think that a good line would appear occasionally by chance. The trouble is, chance has no chance to operate. The bad poet is simply too predictable. Cliché follows cliché; love rhymes with dove, and the narrow pattern is dreadfully monotonous. There is nothing new; there is no surprise.

It would be foolish to maintain that surprise is the only feature, or even a main feature of art, but it is an important feature, and it appears in many surprising places. We certainly are amused when Pepys speak of "my wife, poor wretch." This may have had no element of surprise in the eighteenth century, but it has novelty for us. And it is certain that lack of surprise is a conspicuous element in much inferior art.

Now nothing is more surprising than the number produced by an honest throw of dice. However, the bare numbers turned up have no purely aesthetic interest. It is clear that something else must be added to mere surprise in order to produce anything with amusement value. A clue to what may be added lies in something I discussed in Astounding SCIENCE FICTION some time ago*, something which was based on work that has now appeared in book form as "The Mathematical Theory of Communication," by Claude E. Shannon and Warren Weaver. This work shows how the missing element can be added to mere randomness.

The book points out that for some purposes we can regard English text as a series of letters and spaces produced by a stochastic process. In such a process a letter which follows others is chosen statistically according to its probability of following the preceding letters. Thus, if the preceding letter is q, the letter chosen inevitably will be u. If the preceding letter is t, the letter chosen is very likely to be h, but may be another

*"Chance Remarks," October, 1949.

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letter, some letters being more likely than others.

One can, indeed, construct sequences of letters or words according to a table of probabilities and a table of random numbers, or by an equivalent process. In "Chance Remarks" I gave several examples for the case of letters and one for words from Shannon's work, and these are repeated here:

1. Zero-order approximation — symbols independent and equi-probable. The symbols include the letters of the alphabet and the space.
   XFOML RXKHRJFFJUJ ZLPWCFWKCYJ FFJEYVKCQSGHYD QPAAMKBZAACIBZLHJQD

2. First-order approximation — symbols independent but with frequencies of English text.
   OCRO HLI RGWR NMIELWIS EU LL NBNESEBYA TH EEI ALHENHTTPA OOBTTVA NAH BRL

3. Second-order approximation—diagram structure as in English.
   ON IE ANTSOUTINYS ARE T INCTORE ST BE S DEAMY ACHIN D ILONASIVE TUCOOWE AT TEASONARE FUSO TIZIN ANDY TOBE SEACE CTISBE

4. Third order approximation — trigram structure as in English.
   IS NO IST LAT WHEY CRATICT FROURE BIRS GROCID PONDENOME OF DEMONSTURES OF THE REPTAGIN IS REGROATIONA OF CRE

5. Second-order word approximation, word chosen with the correct probability of following the preceding word.
   THE HEAD AND IN FRONTAL ATTACK ON AN ENGLISH WRITER THAT THE CHARACTER OF THIS POINT IS THEREFORE ANOTHER METHOD FOR THE LETTERS THAT THE TIME OF WHO EVER TOLD THE PROBLEM FOR AN UNEXPECTED.

Now, what about these examples? Suppose you, the reader, were asked to make up a number of "words" which are plausible, pronounceable and not obvious combinations of existing words. This is more difficult than it might seem at first. Yet, a mathematician has here provided a means for doing just this in the second- and third-order letter cases above, a means which could be adapted to the manufacture of "words" by a computing machine.

What of these words? For me, at least, some of them have an emotional tone. Thus, I find DEAMY pleasant and light—from dream? PONDENOME strikes me as solemn; INCTORE as somewhat less so. ILONASIVE has a dubious connotation, and TIZIN sounds foreign. I would not like anyone to characterize me as GROCID—because of

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gross, groceries and gravid?

The reader may amuse himself by conscientiously trying out his own reactions; I think that he will have some. They will be, however, his own. There is no feeling of the author or artist to be conveyed. That which is found is like the rhythm of dripping water, the face on the rock, the scene in the stains on a wall; it is in the mind of the beholder.

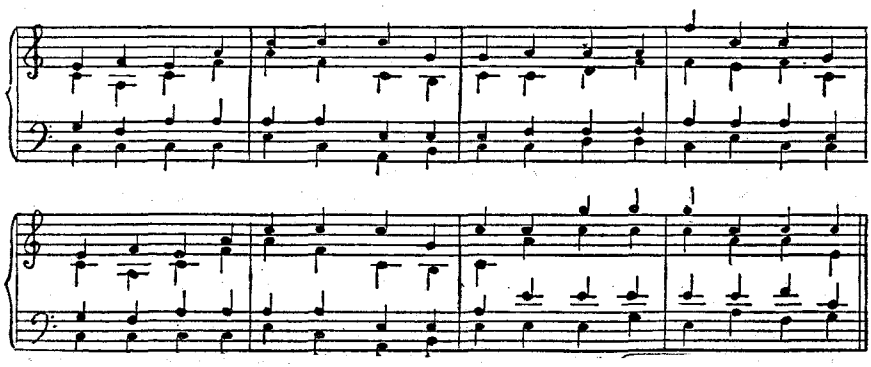
This is one of the most important aspects of the matter. Such chance products as these words give an unalloyed opportunity for what one might call creative appreciation. The enjoyment comes from within; it is the enjoyer's own, and this should make it all the more valuable to him.

We have, then, a way of making patterns by chance, such patterns as can be aesthetically appreciated by the creative reader. The patterns resemble English words, in that they embody some of the statistics of English. Yet, they escape the more complete predictability of direct constructions of the human mind. In these words the predictable element is carefully, mathematically controlled, so that only so much, of such a kind, and neither more nor less enters into the process of construction. Just enough structure can be put in to give the words aesthetic value to the reader, while one can stop short of banality.

One may object that these results are meager, and what else should they be at this stage? One may object that they are not new. Indeed, we are reminded of the word frame which the professor showed to Captain Lemuel Gulliver at the Grand Academy of Lagoda. One can only admit that Swift had the general idea first, but that he may have been wrong in rejecting it summarily.

Let us, then, pursue it further. There are no tables to give probabilities of various words following a given word. None the less we have the second-order word example above. As I noted in "Chance Remarks,"

RANDOM II



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Shannon did this by reading through a book, choosing a word, and then reading on until that word occurred again. He put down the word which followed it in this new location. He then chose a word to follow that word in a like manner, and obtained the passage 5 quoted above. There is nothing behind this passage but blind chance. Nevertheless, I enjoy reading it. My enjoyment must be my own original aesthetic contribution.

"Chance Remarks" also showed how one can get at least a rough idea of what a complicated machine could do by a simple trick. First, write down three words of a sentence in a column at the top of a short slip of paper. Show them to someone and ask him to make up a sentence in which the words occur and to add the word following the three. Turn down the top word and ask the same of another individual. By this process, the choice of a given word is dependent on, but is not determined by, the preceding three words. If one's friends become troubled, the process can be simplified by circulating a large number of slips at once around a circle of five or six individuals. By this means such examples can be produced wholesale. If, in addition, a title is added at the bottom of the slip, so that anyone adding a word has an idea of the general subject, a long-range correlation is introduced. Again some examples were given in "Chance Remarks." For a full appreciation of his capacities for creative artistic enjoyment, the reader will need more, however, and some follow. If no title is given, none was written on the bottom of the slip:

1. This was the first. The second time it happened without his approval. Nevertheless it cannot be done. It could hardly have been the only living veteran of the foreign power had stated that never more could happen. Consequently, people seldom try it.
2. John now disported a fine new hat. I paid plenty for the food. When cooked asparagus has a delicious flavor suggesting apples. If anyone wants my wife or any other physicist would not believe my own eyes. I would believe my own word.
3. That was a relief whenever you let your mind go free who knows if that pork chop I took with my cup of tea after was quite good with the heat I couldn't smell anything off it I'm sure that queer looking man in the
4. I forget whether he went on and on. Finally he stipulaed that this must stop immediately after this. The last time I saw him when she lived. It happened one frosty look of trees waving gracefully against the wall. You never can
5. McMillan's Theorem
   McMillan's theorem states that whenever electrons diffuse in vacua. Conversely impurities of a cathode. No substitution of variables in the equation relating these quantities. Functions relating hypergeometric series with confluent terms converging to limits uniformly expanding rationally to represent any function.

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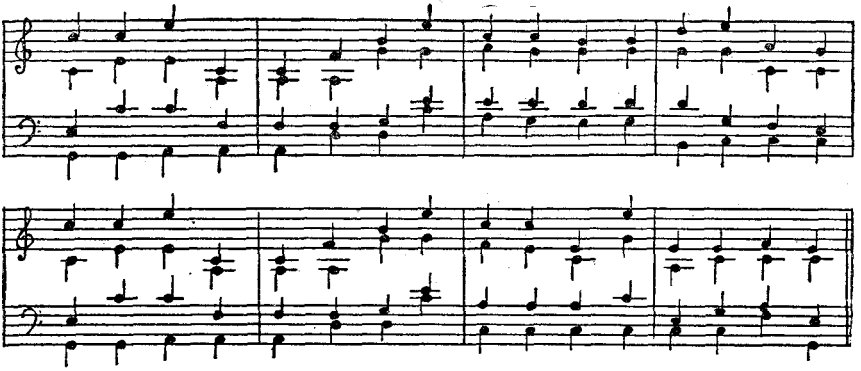
RANDOM III



6. House Cleaning
First empty the furniture of the master bedroom and bath. Toilets are to be washed after polishing doorknobs the rest of the room. Washing windows semiannually is to be taken by small aids such as husbands are prone to omit soap powder.

7. Epiminondas
Epiminondas was one who was powerful especially on land and sea. He was the leader of great fleet maneuvers and open sea battles against Pelopidas but had been struck on the head during the second Punic war because of the wreck of an armored frigate.

Now, I believe that few people will read this material without some interest or amusement. Is this not enough justification in calling it a contribution of mathematics to the arts?

While interest and enjoyment are clearly the contribution of the reader, the reader will be interested and will enjoy only if the text is (1) recognizable in part at least as possible sequences of words, (2) original. Thus, consider "It happened one frosty look of trees waving gracefully againts the wall." We realize that someone might say this, or, even, might want to say it. However, a person's habits are so strong as to make him unlikely to say it. Starting with the first three words, most people would have said something different and more common. The simple process by which the sentence was constructed has no such inhibitions. As a matter of fact, some people don't have many; madmen and great artists. In case the reader has not suspected it already, numbers 3 and 7 are not statistical English. Number 3 is from James Joyce's "Ulysses" and number 7 from the writings of a schizophrenic.

Perhaps the best means for further exploration is the application of simi-

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lar means in a different field of art. In the field of visual art one finds himself anticipated by the kaleidoscope, which combines a random arrangement of colored fragments into a sixfold geometric pattern—a simple example of much the sort of thing we have been considering. We may remember, too, that many years ago Marcel Duchamps allowed a number of threads to fall on pieces of cloth and then framed and preserved them. Our example shall be in the field of music.

In order to construct music by a stochastic process, a catalogue of allowed chords on roots 1-6 in the key of C was made. Actually, it was necessary to make a catalogue of root 1 chords only; the others could be derived. By the throwing of three especially made dice and by the use of a table of random numbers, one chord was chosen to follow another. The only rule of connection was that two succeeding chords have a common tone in the same voice. Each composition consisted of eight measures of four quarter notes each. In order to give some pattern, measures 5 and 6 repeat measures 1 and 2. In addition, it was specified that chords 1, 16 and 32 have root 1 and that chords 15 and 31 have either root 4 or root 5.

Three statistical pieces were rapidly constructed according to these rules. Each took perhaps half a day. They are reproduced here so that the curious may play them.

I asked an experienced pianist to play these three for me several times. After a few repetitions, he came to add a certain amount of phrasing and expression which he felt natural. Thus, he made a *performer's* contribution to these works of art. Certainly one cannot object that he was violating the intentions of the composer.

What about the listener's contribution? In my case, I found the pieces a little meaningless at first, but after I had heard them several times and could recognize them they became more "comprehensible." Acting in the capacity of a music critic, I should say that they are pleasing rather than deep. They are less dull than poor hymns but are considerably inferior to Bach.

From their common characteristics the pieces are clearly products of the same composer. Some identifying features are that voices tend either to stick to one note repeatedly or to jump wildly. Too, many "laws" of harmony—no parallel fifths, no doubling of the leading tone, and so on—are flagrantly ignored.

No doubt, by use of more complicated rules stochastic music could be produced which would violate fewer of the rules of harmony. But, would this result in a gain or a loss? If the process has value, does this value not in some degree come from a lack of prejudice and predictability? Statistical music should be urged toward respectability only with caution.

In this connection it is quite possible that such statistical methods could be of use in trying out pro-

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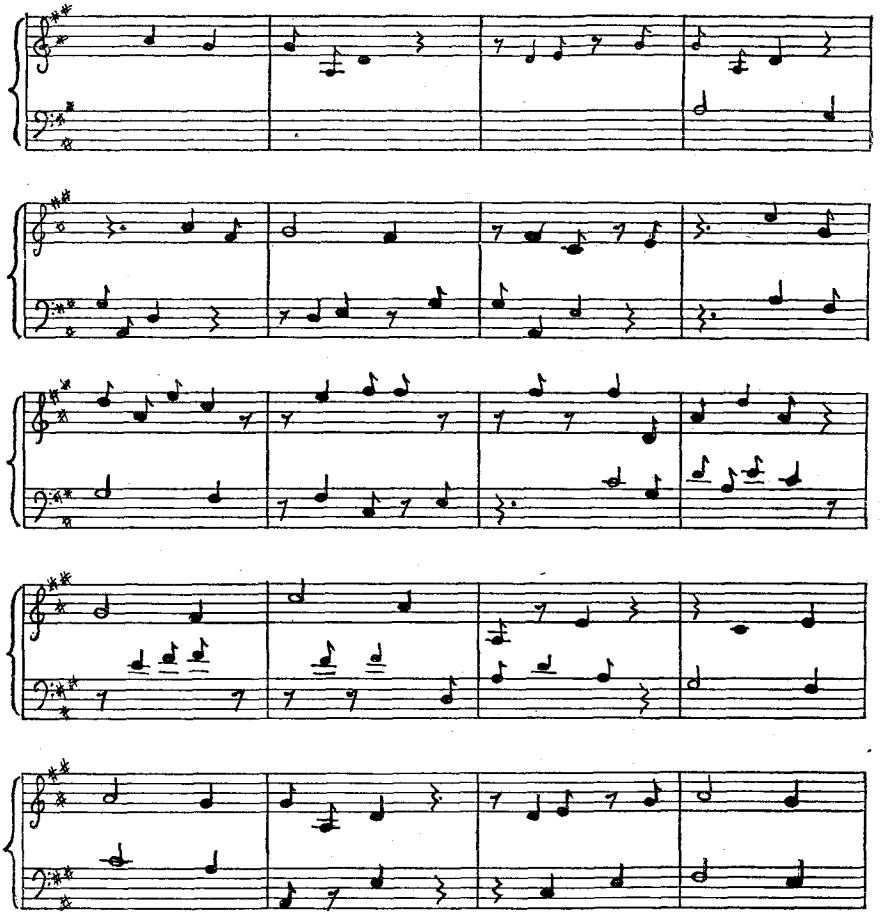
CANON I



posed systems of harmony. It is difficult for a musician easily to follow new rules; a statistical process is indifferent to whether the rules incorporated in it are old and well-known or new and untried.

Returning to the examples of music given, one may object that the three pieces are unduly simple rhythmically and are too conventional harmonically. For the lover of modern music I have concocted a dissonant canon in the whole-tone scale. I will not describe the process of construction in detail, beyond saying that except for the last measure choices

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were made by repeatedly throwing one die. I won't say much for the canon beyond the fact that while the statistical structure is such as to give both cohesion and variety, the process of composition was quite simple. Artistically, it is perhaps a severe challenge to the listener's powers of creative appreciation.

How seriously is all this to be taken? I think that the crude material presented shows that short pieces of amusing and enjoyable text and music can be produced by processes which are essentially statistical in their character. The interest of this text and music is clearly dependent both on familiarity and on surprise. The processes could be refined. It is not beyond conjecture that a machine could write murder mysteries, for instance, each one a little different, at the punch of a button, with *hard-boiled, sex, deduction,* and other styles and features adjusted to the user's individual taste.

All this has, however, raised for me an issue beyond that of the stochastic generation of art. Apparently, if I try hard, I am capable of liking almost anything that is surprising if only it has some order or recognizable feature. Too, I am not entirely alone in this. I wonder, how much of the appreciation of some of the more drastic experiments in writing, music and painting is a combination of a knowledge of the artist's style and tricks and a determined effort to enjoy? How can one tell?

THE END

THE FORMULA FOR ART

Most scientifically inclined major artists have, at one time or another, attempted to reduce their art to some regular, predictable pattern. There seems to be some slight difficulty standing in the way, however.

Leonardo da Vinci, for instance, worked out a mathematical formula by which one could mix colors necessary to produce a desired effect in a painting. The formula worked invariably—for Leonardo da Vinci, who, of course, didn't seem to need a formula very greatly. Somehow, the formula never worked very satisfactorily for his less competent students, though his better students had considerable success in using it—when they chose to. Though they, it happened, didn't ordinarily bother—

Perhaps, the difficulty with formulation of an art is precisely that developed in Coupling's article; only a mind inherently master of the art can misuse the formula in quite the way required to get the effect intended. Notice that Coupling reports that when a musician played the Randoms with free interpretation, inserting the human factor on top of the formula, results are more pleasing.

There probably is a formula for art—but the formula is one necessarily, by its nature, requiring that one factor be the maximum degree of complexity a genius-level mind can invent. This, if it is the case, makes the formula inherently useless; the genius-level mind can and will invent its own; the incompetent can't be helped by it!

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BOOK REVIEWS

"Needle," by Hal Clement, Garden City: Doubleday & Co., Inc., 1950. 222 pp. $2.50

This novel appeared not long ago in Astounding SCIENCE FICTION as a two-part serial. It is that rather anomalous creature, a science-fiction detective story, but with the proper difference to render it legitimate.

Both criminal and detective are extra-terrestrials—metazoans, amorphous jellylike beings who on their native planet live in symbiosis with the dominant polyzoic life-form by invading the bodies of the latter, distributing themselves throughout these bodies in fine filaments, and helping their hosts by their superior intelligence and quicker reactions.

The detective, called the Hunter, is pursuing his quarry in a spaceship when both crash into the Pacific Ocean of the Earth. The Hunter gets out of the wreck of his ship and makes his way to the shore of an island, where he enters the body of an adolescent boy, Robert Kinnaird, for the purpose of carrying on his search. Naturally Kinnaird is much surprised when the entity starts trying to communicate with him by taking temporary control of his muscles and sensory organs. The Hunter guesses that the criminal—an antisocial member of his own species—has sought a similar refuge. But how is he to locate which of two billion human beings harbors his prey? Hence the title.

The idea is very original and the story well written. I have a couple of mild criticisms: that the plot is a little thin to carry a book-length novel, and that the author has "legislated himself out of trouble" by making the criminal act in an improbably stupid manner to enable the Hunter to catch him. Otherwise it is a good sound entertaining yarn.

L. Sprague de Camp

"Men Against The Stars," edited by Martin Greenberg. Gnome Press, New York. 1950. 351 p. $2.95
"Flight Into Space," compiled by Donald A. Wollheim. Frederick Fell, Inc., New York. 1950. 251 p. $2.75

The usual science fiction anthology is essentially an expanded super-issue of a magazine, something like last November's precognitive Astounding SCIENCE FICTION, assembling the best work of the best writers with a degree of over-all balance. It is a much tougher job to build such a collection around a single theme, and two current anthologies show how such a scheme can succeed or fall quite flat.

"Men Against the Stars" contains twelve stories published since 1938, and assembled as "a future story of the conquest of space," from the first Moon-rocket—in Asimov's "Trends"—through the peaks of Gal-

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axy-wide civilization in one of Hull's Artur Blord series and an Asimov Foundation yarn, into the old age of Ron Hubbard's "When Shadows Fall." Willy Ley has contributed an introduction showing where the drive to reach the stars now stands. These are consistently stories of human problems and human values, and the result is one of the best science fiction anthologies to date.

"Flight into Space" is a comedown from Fell's very good "Best Science Fiction Stories: 1949" and from its editor's previous work. It offers a dozen stories of human conquest of the twelve members of the solar system, including the Sun, Moon, and asteroids. Unfortunately, with such exceptions as Weinbaum's "Parasite Planet" and Robert Moore Williams' "The Seekers," the selections are old-hat man-meets-monster stuff, typical of their time — copyrights run back as far as 1929—but not of the field today. It's fine stuff for introducing the teen-ager to science fiction, and for nostalgic *aficionados,* but science fiction has matured, and this book represents its early adolescence.

P. Schuyelr Miller

"The Mightiest Machine," by John W. Campbell, Jr. Hadley Publishing Co., Providence, R. I. 1947. 228 p. Ill. $3.00

"The Incredible Planet," by John W. Campbell, Jr. Fantasy Press, Reading, Pa. 1949. 344 p. $3.00

"The Mightiest Machine," when it appeared in this magazine, represented perhaps the climax of the super-physics school of science fiction which "Skylark" Smith had started. Its great difference was that it took off from known, instead of synthetic, physics. Now the original novel is available in boards, and for good measure three unpublished sequels carry on the adventures of the Jovian physicist Aarn Munro, his chemical counterpart Don Carlisle, and their mathematician bankroll Russ Spencer. Returning from their alliance with Muvian refugees against the inhuman Tefflans—devils —the three dip into another interstellar war and arrive home in time to beat off an invasion of centaurs. The star-milking "transpon" beam is the axis around which the science of the stories revolves, but here are also what may have been the first real use in fiction of transuranium elements, and the brand-new concept of "ultra" elements whose hydrogen has an atomic weight of 4206! The title story of the second book, unfolding the story of the incredibly ancient world of Myrya, is a kind of bridge to the Don A. Stuart style which writer-editor Campbell was then developing. By the by, Menzl's recent theory of sunspots with its solar "shell" of interlocking fields sounds like a quotation from Aarn Munro.

P. Schuyler Miller

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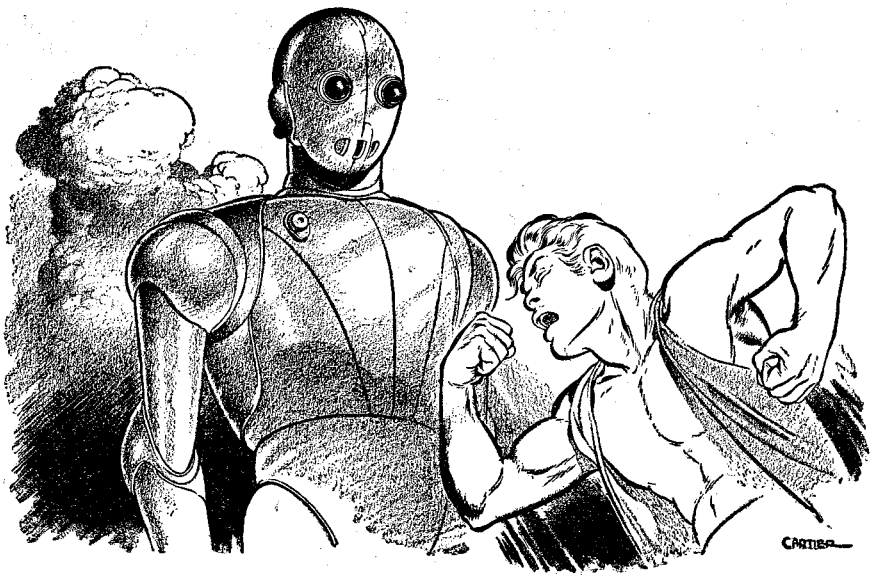

QUIXOTE AND THE WINDMILL

BY POUL ANDERSON

***A man,** capable of a million things, is unhappy without a job, without a goal and purpose in life. But he is not necessarily unique . . .*

Illustrated by Cartier

The first robot in the world came walking over green hills with sunlight aflash off his polished metal hide. He walked with a rippling grace that was almost feline, and his tread fell noiselessly—but you could feel the ground vibrate ever so faintly under the impact of that terrific mass, and the air held a subliminal quiver from the great engine that pulsed within him.

Him. You could not think of the robot as neuter. He had the brutal maleness of a naval rifle or a blast furnace. All the smooth silent elegance of perfect design and construction did not hide the weight and strength of a two and a half-meter height. His eyes glowed, as if with inner fires of smoldering atoms, they could see in any frequency range he selected, he could turn an X-ray

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beam on you and look you through and through with those terrible eyes. They had built him humanoid, but had had the good taste not to give him a face; there were the eyes, with their sockets for extra lenses when he needed microscopic or telescopic vision, and there were a few other small sensory and vocal orifices, but otherwise his head was a mask of shining metal. Humanoid, but not human—man's creation, but more than man—the first independent, volitional, nonspecialized machine—but they had dreamed of him, long ago, he had once been the jinni in the bottle or the Golem, Bacon's brazen head or Frankenstein's monster, the man-transcending creature who could serve or destroy with equal contemptuous ease.

He walked under a bright summer sky, over sunlit fields and through little groves that danced and whispered in the wind. The houses of men were scattered here and there, the houses which practically took care of themselves; over beyond the horizon was one of the giant, almost automatic food factories; a few self-piloting carplanes went quietly overhead. Humans were in sight, sun-browned men and their women and children going about their various errands with loose bright garments floating in the breeze. A few seemed to be at work, there was a colorist experimenting with a new chromatic harmony, a composer sitting on his verandah striking notes out of an omniplayer, a group of engineers in a transparent-walled laboratory testing some mechanisms. But with the standard work period what it was these days, most were engaged in recreation. A picnic, a dance under trees, a concert, a pair of lovers, a group of children in one of the immemorially ancient games of their age-group, an old man happily enhammocked with a book and a bottle of beer—the human race was taking it easy.

They saw the robot go by, and often a silence fell as his tremendous shadow slipped past. His electronic detectors sensed the eddying pulses that meant nervousness, a faint unease—oh, they trusted the cybernetics men, they didn't look for a devouring monster, but they wondered. They felt man's old unsureness of the alien and unknown, deep in their minds they wondered what the robot was about and what his new and invincible race might mean to Earth's dwellers—then, perhaps, as his gleaming height receded over the hills, they laughed and forgot him.

The robot went on.

There were not many customers in the Casanova at this hour. After sunset the tavern would fill up and the autodispensers would be kept busy, for it had a good live-talent show and television was becoming unfashionable. But at the moment only those who enjoyed a mid-afternoon glass, together with some serious drinkers, were present.

The building stood alone on a high wooded ridge, surrounded by its gardens and a good-sized parking

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lot. Its colonnaded exterior was long and low and gracious; inside it was cool and dim and fairly quiet; and the general air of decorum, due entirely to lack of patronage, would probably last till evening. The manager had gone off on his own business and the girls didn't find it worthwhile to be around till later, so the Casanova was wholly in the charge of its machines.

Two men were giving their autodispenser a good workout. It could hardly deliver one drink before a coin was given it for another. The smaller man was drinking whiskey and soda, the larger one stuck to the most potent available ale, and both were already thoroughly soused.

They sat in a corner booth from which they could look out the open door, but their attention was directed to the drinks. It was one of those curious barroom acquaintances which spring up between utterly diverse types. They would hardly remember each other the next day. But currently they were exchanging their troubles.

The little dark-haired fellow, Roger Brady, finished his drink and dialed for another. "Beatcha!" he said triumphantly.

"Gimme time," said the big redhead, Pete Borklin. "This stuff goes down slower."

Brady got out a cigarette. His fingers shook as he brought it to his mouth and puffed it into lighting. "Why can't that drink come right away?" he mumbled. "I resent a ten-second delay. Ten dry eternities! I demand instantaneously mixed drinks, delivered faster than light."

The glass arrived, and he raised it to his lips. "I am afraid," he said, with the careful precision of a very drunk man, "that I am going on a weeping jag. I would much prefer a fighting jag. But unfortunately there is nobody to fight."

"I'll fight you," offered Borklin. His huge fists closed.

"Nah—why? Wouldn't be a fight, anyway. You'd just mop me up. And why should we fight? We're both in the same boat."

"Yeah." Borklin looked at his fists. "Not much use, anyway," he said. "Somebody'd do a lot better job o' killing with an autogun than I could with—these." He unclenched them, slowly, as if with an effort, and took another drag at his glass.

"What we want to do," said Brady, "is to fight a world. We want to blow up all Earth and scatter the pieces from here to Pluto. Only it wouldn't do any good, Pete. Some machine'd come along and put it back together again."

"I just wanna get drunk," said Borklin. "My wife left me. D'I tell you that? My wife left me."

"Yeah, you told me."

Borklin shook his heavy head, puzzled. "She said I was a drunk. I went to a doctor like she said, but it didn't help none. He said . . . I forget what he said. But I had to keep on drinking anyway. Wasn't anything else to do."

"I know. Psychiatry helps people

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solve problems. It's not being able to solve a problem that drives a man insane. But when the problem is inherently insoluble—what then? One can only drink, and try to forget."

"My wife wanted me to amount to something," said Borklin. "She wanted me to get a job. But what could I do? I tried. Honest, I tried. I tried for . . . well, I've been trying all my life, really. There just wasn't any work around. Not any I could do."

"Fortunately, the basic citizen's allowance is enough to get drunk on," said Brady. "Only the drinks don't arrive fast enough. I demand an instantaneous autodispenser."

Borklin dialed for another ale. He looked at his hands in a bewildered way. "I've always been strong," he said. "I know I'm not bright, but I'm strong, and I'm good at working with machines and all. But nobody would hire me." He spread his thick workman's fingers. "I was handy at home. We had a little place in Alaska, my dad didn't hold with too many gadgets, so I was handy around there. But he's dead now, the place is sold, what good are my hands?"

"The worker's paradise." Brady's thin lips twisted. "Since the end of the Transition, Earth has been Utopia. Machines do all the routine work, *all* of it, they produce so much that the basic necessities of life are free."

"The hell. They want money for everything."

"Not much. And you get your citizen's allowance, which is just a convenient way of making your needs free. When you want more money, for the luxuries, you work, as an engineer or scientist or musician or painter or tavern keeper or spaceman or . . . anything there's a demand for. You don't work too hard. Paradise!" Brady's shaking fingers spilled cigarette ash on the table. A little tube dipped down from the wall and sucked it up.

"I can't find work. They don't want me. Nowhere."

"Of course not. What earthly good is manual labor these days? Machines do it all. Oh, there are technicians to be sure, quite a lot of them—but they're all highly skilled men, years of training. The man who has nothing to offer but his strength and a little rule-of-thumb ingenuity doesn't get work. There *is* no place for him!" Brady took another swallow from his glass. "Human genius has eliminated the need for the workman. Now it only remains to eliminate the workman himself."

Borklin's fists closed again, dangerously. "Whattayuh mean?" he asked harshly. "Whattayuh mean, anyway?"

"Nothing personal. But you know it yourself. Your type no longer fits into human society. So the geneticists are gradully working it out of the race. The population is kept static, relatively small, and is slowly evolving toward a type which can adapt to the present en . . . environment. And that's not your type, Pete."

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The big man's anger collapsed into futility. He stared emptily at his glass. "What to do?" he whispered. "What can I do?"

"Not a thing, Pete. Just drink, and try to forget your wife. Just drink."

"Mebbe they'll get out to the stars."

"Not in our lifetimes. And even then, they'll want to take their machines along. We still won't be any more useful. Drink up, old fellow. Be glad! You're living in Utopia!"

There was silence then, for a while. The day was bright outside. Brady was grateful for the obscurity of the tavern.

Borklin said at last: "What I can't figure is you. You look smart. You can fit in . . . can't you?"

Brady grinned humorlessly. "No, Pete. I had a job, yes. I was a mediocre servotechnician. The other day I couldn't take any more. I told the boss what to do with his servos, and I've been drinking ever since. I don't think I ever want to stop."

"But how come?"

"Dreary, routine—I hated it. I'd rather stay tight. I had psychiatric help too, of course, and it didn't do me any good. The same insoluble problem as yours, really."

"I don't get it."

"I'm a bright boy, Pete. Why hide it? My I.Q. puts me in the genius class. But—not quite bright enough." Brady fumbled for another coin. He could only find a bill, but the machine gave him change. "I want inshantaneous auto . . . or did I say that before? Never mind. It doesn't matter." He buried his face in his hands.

"How do you mean, not quite bright enough?" Borklin was insistent. He had a vague notion that a new slant on his own problem might conceivably help him see a solution. "That's what they told me, only politer. But you—"

"I'm too bright to be an ordinary technician. Not for long. And I have none of the artistic or literary talent which counts so highly nowadays. What I wanted was to be a mathematician. All my life I wanted to be a mathematician. And I worked at it. I studied. I learned all any human head could hold, and I know where to look up the rest." Brady grinned wearily. "So what's the upshot? The mathematical machines have taken over. Not only all routine computation—that's old—but even independent research. At a higher level than the human brain can operate.

"They still have humans working at it. Sure. They have men who outline the problems, control and check the machines, follow through all the steps—men who are the . . . the soul of the science, even today.

"*But*—only the top-flight geniuses. The really brilliant, original minds, with flashes of sheer inspiration. *They* are still needed. But the machines do all the rest."

Brady shrugged. "I'm not a first-rank genius, Pete. I can't do anything that an electronic brain can't do quicker and better. So I didn't get my job, either."

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They sat quiet again. Then Borklin said, slowly: "At least you can get some fun. I don't like all these concerts and pictures and all that fancy stuff. I don't have more than drinking and women and maybe some stereofilm."

"I suppose you're right," said Brady indifferently. "But I'm not cut out to be a hedonist. Neither are you. We both *want* to work. We want to feel we have some importance and value—we want to amount to something. Our friends . . . your wife . . . I had a girl once, Pete . . . we're expected to amount to something.

"Only there's nothing for us to do—"

A hard and dazzling sun-flash caught his eye. He looked out through the door, and jerked with a violence that upset his drink.

"Great universe!" he breathed. "Pete . . . Pete . . . look, it's the robot! *It's the robot!*"

"Huh?" Borklin twisted around, trying to focus his eyes out the door. "Whazzat?"

"The robot—you've heard of it, man." Brady's soddenness was gone in a sudden shivering intensity. His voice was like metal. "They built him three years ago at Cybernetics Lab. Manlike, with a volitional, non-specialized brain—manlike, but more than man!"

"Yeah . . . yeah, I heard." Borklin looked out and saw the great shining form striding across the gardens, bound on some unknown journey that took him past the tavern. "They were testing him. But he's been running around loose for a year or so now— Wonder where he's going?"

"I don't know." As if hypnotized, Brady looked after the mighty thing. "I don't know—" His voice trailed off, then suddenly he stood up and then lashed out: "But we'll find out! Come on, Pete!"

"Where . . . huh . . . why—" Borklin rose slowly, fumbling through his own bewilderment. "What do you mean?"

"Don't you see, don't you see?" It's *the robot*—the man after man—all that man is, and how much more we don't even imagine. Pete, the machines have been replacing men, here, there, everywhere. This is the machine that will replace *man!*"

Borklin said nothing, but trailed out after Brady. The smaller man kept on talking, rapidly, bitterly: "Sure—why not? Man is simply flesh and blood. Humans are only human. They're not efficient enough for our shiny new world. Why not scrap the whole human race? How long till we have nothing but men of metal in a meaningless metal ant-heap?

"Come on, Pete. Man is going down into darkness. But we can go down fighting!"

Something of it penetrated Borklin's mind. He saw the towering machine ahead of him, and suddenly it was as if it embodied all which had broken him. The ultimate machine, the final arrogance of efficiency, remote and godlike and indifferent as

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it smashed him—suddenly he hated it with a violence that seemed to split his skull apart. He lumbered clumsily beside Brady and they caught up with the robot together.

"Turn around!" called Brady. "Turn around and fight!"

The robot paused. Brady picked up a stone and threw it. The rock bounced off the armor with a dull clang.

The robot faced about. Borklin ran at him, cursing. His heavy shoes kicked at the robot's ankle joints, his fists battered at the front. They left no trace.

"Stop that," said the robot. His voice had little tonal variation, but there was the resonance of a great bell in it. "Stop that. You will injure yourself."

Borklin retreated, gasping with the pain of bruised flesh and smothering impotence. Brady reeled about to stand before the robot. The alcohol was singing and buzzing in his head, but his voice came oddly clear.

"We can't hurt you," he said. "We're Don Quixote, tilting at windmills. But you wouldn't know about that. You wouldn't know about any of man's old dreams."

"I am unable to account for your present actions," said the robot. His eyes blazed with their deep fires, searching the men. Unconsciously, they shrank away a little.

"You are unhappy," decided the robot. "You have been drinking to escape your own unhappiness, and in your present intoxication you identify me with the causes of your misery."

"Why not?" flared Brady. "Aren't you? The machines are taking over all Earth with their smug efficiency, making man a parasite—and now you come, the ultimate machine, you're the one who's going to replace man himself."

"I have no belligerent intentions," said the robot. "You should know I was conditioned against any such tendencies, even while my brain was in process of construction." Something like a chuckle vibrated in the deep metal voice. "What reason do I have to fight anyone?"

"None," said Brady thinly. "None at all. You'll just take over, as more and more of you are made, as your emotionless power begins to—"

"Begins to what?" asked the robot. "And how do you know I am emotionless? Any psychologist will tell you that emotion, though not necessarily of the human type, is a basic of thought. What logical reason does a being have to think, to work, even to exist? It cannot rationalize its so doing, it simply does, because of its endocrine system, its power plant, whatever runs it . . . its emotions! And any mentality capable of self-consciousness will feel as wide a range of emotion as you—it will be as happy or as interested—or as miserable—as you!"

It was weird, even in a world used to machines that were all but alive, thus to stand and argue with a living mass of metal and plastic, vacuum

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and energy. The strangeness of it struck Brady, he realized just how drunk he was. But still he had to snarl his hatred and despair out, mouth any phrases at all just so they relieved some of the bursting tension within him.

"I don't care how you feel or don't feel," he said, stuttering a little now. "It's that you're the future, the meaningless future when all men are as useless as I am now, and I hate you for it and the worst of it is I can't kill you."

The robot stood like a burnished statue of some old and non-anthropomorphic god, motionless, but his voice shivered the quiet air: "Your case is fairly common. You have been relegated to obscurity by advanced technology. But do not identify yourself with all mankind. There will always be men who think and dream and sing and carry on all the race has ever loved. The future belongs to them, not to you—or to me.

"I am surprised that a man of your apparent intelligence does not realize my position. But—what earthly good is a robot? By the time science had advanced to the point where I could be built, there was no longer any reason for it. Think—you have a specialized machine to perform or help man perform every conceivable task. What possible use is there for a non-specialized machine to do them all? Man himself fulfills that function, and the machines are no more than his tools. Does a housewife want a robot servant when she need only control the dozen machines which already do all the work? Why should a scientist want a robot that could, say, go into dangerous radioactive rooms when he has already installed automatic and remote-controlled apparatus which does everything there? And surely the artists and thinkers and policy-makers don't need robots, they are performing specifically human tasks, it will always be *man* who sets man's goals and dreams his dreams. The all-purpose machine is and forever will be—man himself.

"Man, I was made for purely scientific study. After a couple of years they had learned all there was to learn about me—and I had no other purpose! They let me become a harmless, aimless, meaningless wanderer, just so I could be doing something—and my life is estimated at five hundred years!

"I have no purpose. I have no real reason for existence. I have no companion, no place in human society, no use for my strength and my brain. Man, man, do you think *I* am happy?"

The robot turned to go. Brady was sitting on the grass, holding his head to keep it from whirling off into space, so he didn't see the giant metal god depart. But he caught the last words flung back, and somehow there was such a choking bitterness in the toneless brazen voice that he could never afterward forget them.

"Man, you are the lucky one. *You* can get drunk!"

THE END

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THE HAND OF ZEI

BY L. SPRAGUE DE CAMP

***For a man** so thoroughly afraid of women, that Amazonian-ruled country was scarcely the chosen land of opportunity. It was just that he* had *to go there . . .*

Illustrated by Cartier

Synopsis

In the Banjao Sea on the Cetic planet Krishna lies the Sunqar, a floating continent of terpahla sea vine. Rumor associates the Sunqar with the janrú drug which, smuggled out of Krishna and used in perfumes, enables any woman completely to dominate any man.

The explorer Igor Shtain plans to invade the Sunqar to clear up the mystery and incidentally to collect scientific data—actually to be gathered by his associate, George Tangaloa the Samoan xenologist—and material for his books—to be written by his ghost-writer Dirk Barnevelt—and lectures—to be delivered by an actor impersonating him. For in this age of specialization—the Twenty-second Century—all these experts work for the firm of Igor Shtain Ltd. to set before the public a synthetic entity called Igor Shtain, of which the flesh-and-blood Shtain is only a part.

The flesh-and-blood Shtain, however, disappears, and the dismayed members of his firm suspect he has fallen afoul of the janrú ring—perhaps been killed or taken to Krishna. As they have a contract with Cosmic Features for fifty thousand meters of Krishnan movie film, a quarter of which must be taken in the Sunqar, they send Tangaloa and Barnevelt—a shy young ex-teacher suffering from a mother-complex—to carry out Shtain's plans and look for the missing explorer. While Interplanetary Council regulations forbid revealing inventions and mechanical devices to

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the pre-machine-age Krishnans, the travelers are allowed to take one-millimeter Hayashi cameras, set in finger rings and looking more like jewels than optical devices.

At Novorecife, the Viagens Interplanetarias *station on Krishna, the assistant security officer, Castanhoso, advises them to travel as natives of the South Polar land of Nich-Nyamadze, who shave their scalps. They thus need not wear green wigs or dye their hair, though they will still have to don false smelling antennae and ear points to pass as Krishnans. They buy costumes from Vizqash, the Krishnan clerk in the Outfitting Store. Vizqash, a native of Qirib, takes them on a picnic with Castanhoso's secretary. A gang of Krishnans under Vizqash's orders attacks Barnevelt and Tangaloa, who escape by swimming across the Pichidé River. Vizqash, thinking them dead, returns to Novorecife with the girl—who is in league with him—but is arrested when his victims also return to accuse him. However, he escapes before any information can be obtained from him.*

Barnevelt and Tangaloa plan to go down the river to Madjbur on the Sadabao Sea, where they will present an introduction from Castanhoso to Gorbovast, the commissioner in the Free City of King Eqrar of Gozashtand. Gorbovast will give them an introduction to Queen Alvandi of Qirib, whence they expect to leave for the Banjao Sea. Qirib is a matriarchal monarchy where the females keep the upper hand over the males by the janrú drug, and where the king is chosen by lot each year and then ceremonially killed at the end of his year's reign. The travelers pretend they are going to hunt the gvám, a sea monster, the stones from whose stomach are believed by the Krishnans to confer Donjuanian powers on a man who carries one. Barnevelt takes the name of Snyol, a famous Nich-Nyami general, and Tangaloa another Nich-Nyami name, Tagde. As a present for Queen Alvandi they take a macaw named Philo, abandoned at Novorecife by his owner, Mirza Fateh, a Cosmotheist missionary from Iran—Earth—who once lost his wife—killed—and daughter—kidnaped—in a holdup of a Krishnan train.

They proceed to Madjbur by river barge and thence to Djazmurian, south along the coast, by bishtar-drawn train. At the inn in Djazmurian they are forced to room with Sishen, a tourist from the Procyonic planet Osiris, resembling a small bipedal dinosaur. At dinner their picture is taken by a Krishnan photographer with a primitive box-type camera, lately invented on the planet. An ill-mannered traveling-companion named Gavao sits with them and puts a knockout drop into Barnevelt's drink, but Barnevelt switches drinks with him and Gavao falls asleep. A masked aristocrat quarrels with Sishen, and Barnevelt

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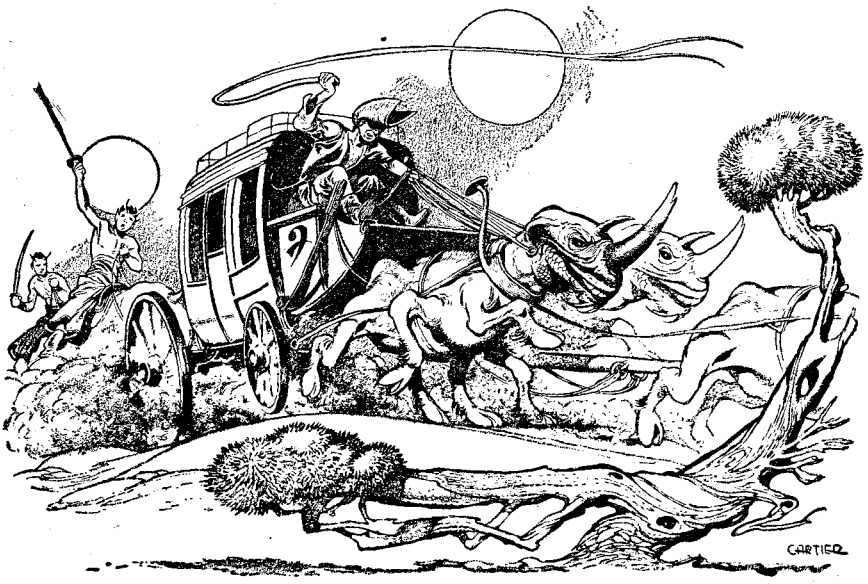

saves the reptile's life by hitting the masked man over the head and stunning him. Barnevelt recognizes the masked man as Vizqash, the former clerk at Novorecife, who, not knowing who struck him, leaves the inn in a rage. Sishen, expressing his gratitude, explains that he did not have time to use the pseudohypnotic powers of his species to gain mental control of the Krishnan.

Next morning Barnevelt and Tangaloa are confronted by a delegation from the local artists' guild who demand the pictures made by the old photographer. They are campaigning against the new art of photography on the ground that it threatens their livelihood. In the ensuing brawl the Earthmen rout the gang, and are then ready to resume their journey.

Part 2

VI.

On the boulevard, beside the depot, a big stagecoach drawn by six horned ayas stood waiting. The expressman who had ridden with them from Madjbur was already there, talking with the driver, but of Sir Gavao there was no sign.

Barnevelt asked the driver: "Is this the diligence for Ghulindé?"

Receiving the affirmative head-motion, he and Tangaloa gave the man the remaining stubs of their combination rail-and-coach tickets. They stowed their bag on top—the baggage-rack at the rear being full—and climbed in with their bird cage.

The interior of the coach seated about a dozen, and by the time the vehicle left it was somewhat over

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half full. Most of the passengers wore the wrap-around garb of Qiríb —which reminded Barnevelt of the patrons of a Turkish bath—instead of the tailored garments of the more northerly regions.

The driver blew his trumpet and cracked his whip. Off they went, the wheels rattling over cobblestones and splashing through puddles. Since the load was comparatively light the springs were stiff and gave the passengers a sharp bouncing.

Barnevelt said: "I think both Vizqash and Gavao are agents of the Sunqar crowd, with orders to get us."

"How so?" said Tangaloa.

"It all fits. The plan last night was for Gavao to dope us, and then he and Vizqash, claiming to be dear old friends of ours, would lug us out into the alley and cut our throats. When I doped Gavao instead, Vizqash didn't know what to do about it. You saw how he stood there glaring at us?"

"That sounds reasonable, Sherlock. And speaking of Sishen—" Tangaloa switched languages and asked the expressman: "Did you tell us that the mysterious Sheafasè, who rules the Sunqar, has a scaly hand with claws?"

"Even so, good my lords."

"You actually think Sishen *is* Sheafasè?" said Barnevelt. "And we slept in the same room with him? That's worse than swimming with the avval."

"Not necessarily; that quarrel looked genuine. But suppose you'd known the two were the same, what would you have done about it?"

"I don't know—you can't erase a passing stranger on mere suspicion. It seems unlikely the real head of the Sunqar gang would prowl around incog like that Caliph in the 'Arabian Nights.'"

"We shall no doubt learn in time."

"Ayuh, though I like this job less and less. To catch a dragon in a cherry net, to trip a tigress with a gossamer, were wisdom to it."

Barnevelt offered a cigar to the expressman, who took it but said: "To smoke herein is forbidden, my masters. Therefore will I wait for a halt to clamber to the top."

Barnevelt found the smell of a lot of Krishnans in an inclosed space oppressive, something like that of a glue factory. He wished the Interplanetary Council in one of its spasms of liberal-mindedness would let knowledge of the art of soap-making into the planet. After all they had let in printing, much more revolutionary.

He was glad when they stopped at a hamlet to drop a passenger and a couple of packages. He got out, lit up, and climbed to the top along with Tangaloa and the expressman. The coach started up again, following the railroad around the shores of Bajjai Bay, crossing creeks and embayments. At Mishdah, at the base of the Qiríbo peninsula, the road swung to the left, or east, along the northern shore of the peninsula, while the track disappeared to the right towards Shaf.

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The road now began climbing to the high ground on the south side of the bay, where rocky headlands crested with small wind-warped trees overlooked leagues of choppy green water. Once the grade was so steep the male passengers had to get out and push. They wound along a hilly coast road, up and down and around stony points and prominences. The trees were bigger and more numerous than any the Earthmen had yet seen on Krishna, with trunks of glossy green and brown and purplish hues. Sometimes branches projecting over the road barely cleared their heads. The coach rocked and the wind whistled.

They had been rattling along this way for some time when a sudden onset of sounds drew their attention. Out of a clump of trees galloped a dozen armed men on ayas.

Before the passengers could react to their presence, the leading pair of the group had come up alongside the coach. On the starboard side rode the Earthmen's late train-companion Gavao bad-Gargan, shouting:

"Halt! Halt ye on pain of death!"

On the other side came one whom Barnevelt did not recognize, a leathary-looking fellow with one antenna missing, who caught the hand holds on the sides of the coach, hoisted himself adroitly off his mount, and started to climb to the top with a knife between his teeth in the best Captain Blackbeard style.

Barnevelt, who had been daydreaming, was slow to take in the import of this visitation. He had only begun to pull himself together and reach for his sword when the iron head of Tangaloa's mace came down with a crunch on the boarder's skull. A second later came a twang as the driver discharged a crossbow-pistol at Gavao. The bolt missed the rider but struck the mount, which bleeped with pain, bucked, circled, and dashed off the road towards the rocks of the shore below.

The driver stuck his weapon back in its bracket and cracked his whip furiously, yelling: *"Hao! Hao-qaí!"*

The six animals leaned forward in their harness and pulled. Away the coach rattled, faster and faster. Behind it the pursuers were thrown into momentary confusion by the bolting of their leader's mount. Some halted at the body of the man whose skull Tangaloa had stove, and one pulled up so quickly he fell off his aya. Then a bend hid them.

"Hold on," said the driver as they took a turn on two wheels. From the interior of the coach below came a babble from the other passengers.

Barnevelt, gripping the arm rest at the end of his seat, looked back. As the road straightened momentarily the pursuit appeared, though they were now too far behind to recognize individuals. Stones from the thirty-six hoofs of the team rattled against the body of the coach. Another bend, and they were again out of sight of their attackers.

Barnevelt asked the driver: "How far to the next town?"

"About twenty hoda to Kyat," was

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the reply. "Here, load you my arbalest!"

Barnevelt, wrestling with the cross-bow pistol, said to Tangaloa: "At this rate they'll catch us long before we get to the next town!"

"That's fair cow. What shall we do?"

Barnevelt looked at the tall trees. "Take to the timber, I guess. Grab the next branch that comes near and hope they go by without seeing us." He turned to the driver, saying: "They want us, and if you'll slow up when told we'll relieve you of our perilous presence. But don't tell 'em where we left, understand?"

The driver grunted assent. The pursuers, nearer yet, came into sight for a few seconds. More arrows whistled; one struck home with a meaty sound. The expressman cried: "I am slain!" and fell off the coach into the road. Then the riders again were hidden.

"This one's too high," said Tangaloa, eying a branch.

The coach rocked and bounced along behind its straining team. The whip cracks and shouts of the driver never stopped.

Barnevelt said: "This one's too thin."

Suddenly he had an idea. He seized their duffel bag and hurled it as far as he could from the coach, so that it fell into a clump of shrubs that swallowed it up.

"How about the cockatoo?" said Tangaloa.

"He's below, and anyway he'd give us away by yelling. Here, this one'll do. Slow down, driver!"

The driver pulled on his brake handle; the coach slowed. Barnevelt climbed to the seat on which he had been sitting and stood precariously balanced, swaying with the motion of the vehicle. The branch came nearer and nearer.

"Now!" said Barnevelt, launching himself into space. The branch struck his arms with stinging force. Then with a grunt and a heave he was up on top of it, then standing on it and holding another to balance himself. Tangaloa was slower in struggling up. The branch sank with the weight, so that whereas it had been about level before they seized it, they now had a sharp grade up to the tree trunk.

"Hurry," said Barnevelt, for his companion was having an awkward time keeping his footing on the slick bark. Any second the pursuit would come around the last bend, and it wouldn't do to have them teetering in plain sight.

They scrambled up to the trunk and slipped around it just as the kettledrumming of hoofs and clank of scabbards told that Gavao's gang was coming up. They went past almost close enough to spit on, Gavao again in the lead. Barnevelt and Tangaloa held their breaths until the Krishnans were out of sight.

Tangaloa wiped his forehead with his sleeve, his face a noticeably lighter shade of brown. "Didn't know I could perform a feat like that at my age and weight. Now what?

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When that push catches the coach they will find out we are not aboard, and they'll be back on our hammer in no time."

"We'll have to head inland and try to lose 'em on foot."

"Let's get our dilly-bag first . . . Wait, here they come already!" For the sound of hoofs had begun to rise again.

"No," said Barnevelt, peering, "it's the coach! What the devil's it coming back for?"

Tangaloa said: "It's another coach entirely. Let's catch it back to Djazmurian, what say? Safer than the bush."

"O. K." Barnevelt swarmed down the tree and ran out into the road just as the coach came by.

The brake screeched as the vehicle slowed. The Earthmen ran alongside, caught the hand holds, and hoisted themselves up.

"Slow down just a minute!" called Barnevelt. He dropped off, ran to the side of the road to [illegible] the duffel bag, and rejoined the [illegible]oach. He tossed the bag onto the stern rack and grabbed the hand holds again.

"All aboard," he said, hauling himself to the top and panting for breath. "What's the fare to Djazmurian?"

As he accepted their money, the driver said: "By the left ear of Tyazan, ye gasted me nigh out of my breeches, leaping out like that. Had ye aught to do with the commotion back yonder?"

"What commotion?" asked Tangaloa innocently.

"I was waiting at the turnout for the eastbound coach to pass, when it came by ahead of time, racing as though Dupulán were after it. Then just as I was about to move out onto the queen's highway, along came a troop of armed men, riding like fury after the other coach. Misliking their looks I've been driving with utmost dispatch ever since. What know ye of these?"

They assured him with nervous glances to the rear that they knew nothing at all.

Tangaloa said: "Dirk, how *are* we to get to Ghulindé with these doers haunting the line?"

Barnevelt asked the driver: "Is there any shipping between Djazmurian and Ghulindé?"

"Certes; there's much haulage of falat-wine to all the ports of the Sadabao Sea, for ensample."

And so it cam[illegible]out that evening found them putting out into Bajjai Bay aboard a tubby wallowing coastal lateener, the Giyám, so laden with wine jars that her freeboard could only be measured in centimeters. The master laughed at their obvious apprehension when a lusty wave sent a sheet of water racing across the deck.

"Nay," he said, "'twill not be the season of the hurricane for several ten-nights yet."

For want of anything better to do, Barnevelt dug out of the bag the navigational handbook he had bought in Novorecife and tried to work out

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a line-of-position from the meager data provided by the ship's compass —which spun this way and that in maddening disregard of direction—the time as given by his pocket sundial, and Roqir's altitude as worked out by an improvised astrolabe. With so many sources of inaccuracy, however, his calculations showed the ship hundreds of hoda up the Zigros River, between Djeshang and Kubyab.

"Reading's useless baggage for the true sailorman," said the master, watching Barnevelt's struggles with amusement. "Here I have never learned the clerkly art, and look at me! Nay, 'tis better to spend one's time watching wave and cloud and flying thing, and becoming wise in their ways; or yet in learning the habitudes of the local gods, so that ye please each in his own bailiwick. Thus in Qiríb I'm a faithful follower of their Mother Goddess, but in Madjbur I'm a votary of jolly old Dashmok, and in Gozashtando ports a devotee of their cultus astrological. Did our seas reach to your cold Nich-Nyamadze, I'd doubtless learn to adore squares and trigons as do the sour Kangandites."

It was high time, Barnevelt thought, that he and George decided how they were going to gain access to the Sunqar. After some casting about for ideas, they resolved to combine those that had already been suggested to them by their friends and acquaintances on Krishna—in other words, they would seek entry with one or both of them disguised as expressmen of the Mejrou Qurardéna with a package to deliver.

The wind held fair and true, and the morning of the third day found the *Giyám* heading into the harbor of Ghulindé. As the sun rose out of the sparkling sea, Barnevelt stared in silent wonder.

Before them lay the port, not properly Ghulindé at all but the separate city of Damovang. Southwest of Damovang rose tall Mount Sabushi. In times long past, before the matriarchate had elevated the cult of the fertility-goddess and suppressed its competitors, men had carved the mountain into an enormous squat likeness of the war-god Qondyorr—called Qunjár by the Qiríbuma—as though sitting on a throne half-sunk in the earth, to the height of the god's calves. Time had blurred the sculptors' work, especially around the head, but the city of Ghulindé proper with its graceful forest of spiky spires lay in the great flat lap of the god.

Finally, far behind Mount Sabushi, against the sky rose the towering peaks of the Zogha, the range from which came the mineral wealth that gave the matriarchal kingdom a power out of proportion to its modest size.

Another hour and they were climbing the steep hill that led up the apron of Qondyorr to the city of Queen Alvandi, through a crowd of Qiríbuma, whose dress-convention seemed to be that if one had a piece of fabric with one one was clad, even though one merely draped it

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over one arm. Barnevelt observed that, whereas the women dressed with austere simplicity, the men went in for gaudy ornaments and cosmetics.

"Now," said Barnevelt, "all we need is a present for the queen to replace that macaw."

"Do you think the stagecoach line would have kept it? I don't suppose they have a lost-and-found department."

They sought out the coach company and inquired. No, they were told, nobody knew anything about a cage containing an unearthly monster. Yes, that stage held up between Mishdah and Kyat had come in again, but the driver was off on a run at the moment. If they had left such a cage on the diligence, the driver had probably sold it in Ghulindé. Why didn't the gentlemen make the rounds of the pet shops?"

There were three of these in town, all in the same block, and before they had even entered one the Earthmen knew where their quarry was by the shrieks and obscenities that issued from the one harboring Philo.

Inside there was a tremendous noise. In a cage near that of Philo a bidjar rustled its leathery wings and made a sound like a smith beating on an anvil, while in another a two-headed rrayef brooded over a clutch of eggs and quacked. A big watcheshun scrabbled at its wire netting with the front pair of its six paws and howled softly. The smell was overpowering.

"*That* thing?" said the shopkeeper when Barnevelt told him he was interested in the macaw. "Take it for half a kard and welcome; I was about to drown the beast. It has bitten one of my best customers who was minded to buy it ere he learned of its frompold disposition; and screams insults at all and sundry."

They bought back their bird, but then Barnevelt wanted to linger and look over the other animals. He said:

"George, couldn't I buy one of these little scaly things? I don't feel right without a pet."

"No! The kind of pet you need walks on two legs. Come on." And the xenologist dragged Barnevelt out. "It must be that farm background that makes you so fond of beasts."

Barnevelt shook his head. "It's just that I find them easier to understand than people."

At last, when Roqii was westering in the sky and the folk of Ghulindé stopped their work for their afternoon cup of shurab and snack of fungus-cakes, Dirk Barnevelt and George Tangaloa, weary but alert, entered the palace. Barnevelt repressed his terror at the prospect of meeting a lot of strangers. They passed between pairs of woman guards in gilded kilts and brazen helms and greaves and brassières, and were run through a long series of screening-devices before being ushered into the presence of Alvandi, Douri of Qiríb.

They found themselves in the presence, not of one woman, but

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two: one of advanced years, square-jawed, heavy-set; the other young and—not exactly beautiful—but handsome in a bold-featured way. Both wore the simple unoppressive sort of garb that ancient Greek sculptors attributed to Amazons, which contrasted oddly with the flashing tiaras they bore upon their heads.

The Earthmen, having forehandedly boned up on Qiríbo protocol, knelt while a functionary presented them.

"The Snyol of Pleshch?" said the elder woman, evidently the queen. "An unexpected pleasure, this, for my agents had reported you slain. Rise."

As they rose, Tangaloa launched into his rehearsed speech of presentation, displaying the macaw. When he had finished, the functionary took the cage from him and retired. The Queen said:

"We thank you for your generous and unusual gift. We'll bear in mind what you have told us of this creature's habits—a *bord,* said you it was called upon its native planet? And now, sirs, to your business. You shall deal, not with me, but with my daughter, the Princess Zéi, whom you see sitting here upon my left. For within a ten-night comes our yearly festival called kashyó, after which I'll abdicate in favor of my dutiful chick. 'Tis méet, therefore, that she should gain experience in bearing burdens such as sit upon our shoulders, before responsibility in very truth descends upon her. Speak."

Barnevelt and Tangaloa had agreed in advance that, while the latter made the first speech, the former should make the next. As he looked at the women, however, Dirk Barnevelt found himself suddenly tongue-tied. The seconds ticked away, and no words came.

The reason for this was not that Zéi was a rather tall, well-built girl, rather dark of skin, with large dark eyes, a luscious mouth, and a nose of unusual aquilinity for a Krishnan. She might in fact have stepped off a Greek vase-painting except for the antennae, the dark-green hair, and the leprechaunian ears.

No, Barnevelt had seen striking girls before. He had dated them too, even though his mother had always managed to break things up before they got serious. The real reason he found himself unable to speak was that Queen Alvandi, in tone and looks, reminded him forcibly of that same mother, only on a larger, louder, and even more terrifying scale.

As he stood with his mouth foolishly half-open, feeling the blush creep up his ruddy skin, he at last heard the soft voice of Tangaloa break into the embarrassing silence. Good old George! For having rescued him in that horrid moment, Barnevelt would have forgiven his colleague almost anything.

"Your altitude," said Tangaloa, "we are but wandering adventurers who beg two favors: first, to be allowed to present our respects to you, as you have generously permitted us to do; second, to raise in Ghulindé

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a company to sail into the Banjao Sea in search of gvám-stones."

The girl cast an appealing glance at her mother, whose face remained stony. Finally Zéi answered:

"Gorbovast tells us of your gvám-hunting proposal in this his letter." She touched the paper on her desk. "Not sure am I, however, that the gvám-stone quest is sanctioned by the Mother Goddess, since if the common belief respecting it be true, it affords the male an advantage contrary to the principles of our state—"

While she hesitated, Queen Alvandi prompted her in a stage-whisper: "Tell 'em 'tis lawful sobeit they pay our taxes and sell their baubles far from here!"

"Well . . . uh . . . however," said Zéi, "we can extend permission on two conditions: that you sell not the stones within the bourn of Qiríb, and that you pay, from your profits on this transaction, subject to the scrutiny of our auditors, one-tenth to the treasury of the realm of Qiríb, and an additional tenth to the coffers of the Divine Mother."

"Agreed," said Barnevelt, recovering his voice at last. It was easy enough to promise a cut on the gvám-stone profit when he and George knew there wouldn't be any such profit.

"Make 'em put up a bond!" hissed Alvandi. "Otherwise how shall we collect our money, once they've got their stones and are beyond our reach?"

"A . . . a slight bond, sirs, will be required," said Zéi. "Of . . . of, let's say, a thousand karda. Can you meet it? On your return, all above the amount of our tax shall be returned to you."

"We can meet it," said Barnevelt after some fast mental calculations.

"I'd have mulcted 'em for five thousand," grumbled Alvandi. "Oh, well, Snyol of Pleshch always bore the reputation of—"

At that instant a round-faced young Krishnan strode in unceremoniously, saying loudly in a high voice: "A bearer of ill tidings I, fair Zéi, for the Prefect and his lady are laid low by some tisick and cannot come tonight . . . I crave pardon; do I interrupt an audience of weight and worth?"

"Worth enough," growled Alvandi, "to make one of your graceless intrusions more vexing than is its usual wont. Here we have a pair of perfect gentle cutthroats from the regions of the nether pole, where folk have names none other can pronounce and where a bath is deemed a shocking heathen custom. Yon gangler on the left hight Snyol of Pleshch, while this unwieldy mass of flesh upon the right gives as his barbarous appellation Tagde of Vyutr. This lown who into the flow of your eloquence has broken, my widely-traveled friends, is Zakkomir bad-Gurshmani, a ward of the throne and my daughter's familiar."

"General Snyol'!' cried Zakkomir, his round made-up face taking on a reverent expression. "Sir, may I grasp your thumb in abject homage?

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Long have I followed your deeds in admiration. As when with but a single wing of troops having upon their feet those boards you use for sliding on snow . . . skis, I think they're called . . . you did overthrow and rout the wretched rabble of Olñega. But I looked to see you one of greater age?"

"We come of a long-lived family," said Barnevelt gruffly, wishing he knew more about the man he was impersonating. Although he was not too favorably impressed by this painted youth, the latter's admiration seemed unbounded.

Zakkomir addressed Zéi: "Princess, 'twere unworthy of us to deal with one of such eminence as though he were a common hilding, merely because the false cult of the Kangandites has driven his forth from the realm he served so well to become a wanderer upon the planet. Since the Prefect and his dame be indisposed, let's have these masters in their stead tonight. What say you?"

"An idea worth pondering," said Zéi. " 'Twould give us a full table of chanízekash."

"Ever a creature of whim," said Alvandi. "Such an invitation before even have their bona fides been confirmed! Oh, have 'em in, since not without dishonor may we withdraw an invitation once extended. But post a guard over the best royal plate. Perchance they'll prove more guestly than the locals, all of whom are either queer or dull, and ofttimes both."

VII.

Although Barnevelt had expected the assembling of the expedition to consume a week, all the major matters had been taken care of by the end of the long Krishnan day. There were a dozen ships and boats for sale: an all-sail fisherman, seaworthy but slow; a naval galley-barge that would have needed a larger crew than the Earthmen cared to ship; a couple of wormy wrecks good for little but firewood—

"You pick her, pal," said Tangaloa, blowing smoke rings. "You are the naval expert."

Barnevelt finally chose an anomalous little craft with a single lateener mast, fourteen one-man oars, and a stench of neglect. Nowever, under her dirt he recognized good lines and satisfied himself that her wood was sound.

He shot a keen look at the trader. "Was this craft built for smuggling?"

" 'Tis true, Snyol; how knew you? The queen's men took it from a crew of illegals, and sold it at auction. I bought it in hope of turning a small but honest profit. But for three revolutions of Karrim has it lain upon my shelf, for legal traders and fishers find it not sufficiently capacious for their purposes, while for military use is it too slow. Therefore do I offer it cheaply—a virtual gift."

"What's it called?"

"The *Shambor,* a name of good omen."

The price the man asked did not

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strike Barnevelt as exactly giving the ship away, however. When he had beaten the dealer down as far as he thought he could, Barnevelt bought the ship and made arrangements for careening, scraping, painting, and renewing all questionable tackle. Then he and Tangaloa repaired to the Free Labor Mart and posted applications with the crier for seamen of exceptional courage and loyalty, because, as he made plain, the expedition entailed risks of no ordinary jeopardy.

After that they went to a second-hand clothing shop where they procured the blue uniform of a courier of the Mejrou Qurardéna. And as the uniform, the only one in stock, fitted Barnevelt fairly well while Tangaloa could not get into it, Barnevelt was elected to wear it for the invasion of the Sunqar.

When their dinners had settled and they had gone back to their room to put on their best clothes, they set out for the palace which, like most of Ghulindé, was lighted by jets of natural gas. They were ushered into a room containing Queen Alvandi, Princess Zéi, Zakkomir bad-Gurshmani, and a paunchy, bleary-eyed, middle-aged Krishnan sadly setting out a game-board.

"My consort Kádj, such as he is," said Queen Alvandi, introducing the Earthmen under their Nich-Nyami pseudonyms.

"It's a great honor," said Barnevelt.

"Spare me these empty encomiums," said King Kádj. "Once had I, like you, some small name in gests of war or sport, but all's done now."

"Rrrrrk," said a familiar voice, and there was Philo in his cage. The macaw let Barnevelt scratch among the roots of his feathers without trying to bite.

The king continued: "Play you chanidjekka?"

Barnevelt, a little taken aback by Zéi's rising to offer him her seat, peered at the game board. The latter looked somehow familiar: a hexagonal board with a triangular criss-cross of lines covering the interior area.

"Father!" said Zéi, who had just lighted her cigar on a gas jet. "How oft must I tell 'tis pronounced 'chanízekash'?"

"The proper form of the name," said Queen Alvandi, "is 'chanichekr'."

"Be not absurd, Mother!" said Zéi. "'Tis 'chanízekash', is't not, Zakkomir?"

"Whatever you say's right by definition, O star-jewel of the Zogha," said that young man.

"Weather vane!" said the queen. "Any noddy knows—"

King Kádj snorted. "If I have but a ten-night to anticipate, then by Qunjár I'll call it what I please!"

"If you say it, 'tis probably wrong," said Queen Alvandi, "and I take ill your calling on a sanguinary god whom the righteous edicts of my predecessors have banished from the land! I have always understood 'chanichekr'. How say you, men of

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Nich-Nyamadze?"

Barnevelt gulped. Feeling a little like a man who has been asked to step into a cage to separate a pair of fighting lions, he replied: "Well . . . uh . . . in my land it's known as 'Chinese checkers'."

"Just as I pronounced it," said the queen, "save for your barbarous outland accents. Chanichekr shall it be to any who'd play with me. Choose you now,, and red moves first."

She held out a fistful of markers, one of each of the six colors. King Kádj drew red. He looked at it lugubriously, saying:

"Were I as lucky in the kashyó drawing as in this, I should not now face a wretched and untimely cease—"

"Stop your croaking, you wormy old aquebat!" yelled the queen. "Of all my consorts you're the most useless! Anyone would think you'd not had all the luxe the land provides in the year just gone. Now to your play; you're for slowing the game."

Barnevelt inferred that Kádj was one of those one-year consorts decreed by the curious customs of this land, and that the end of his term and of his life were fast approaching in the form of the kashyó festival. Under the circumstances he could hardly blame Kádj for taking a dim view of things.

"Zakkomir," said Princess Zéi, "you'll get nowhere with a move of that description. Why build you not a proper ladder?"

"Play your own game and keep your big nose out of mine, sweetling," retorted Zakkomir.

"The insolence of the princox!" cried Zéi. "Master Snyol, would you term my nose large?"

"Matter of fact, I should call it 'aristocratic' rather than plain 'big,'" said Barnevelt, who had been stealing furtive looks at the princess' boldly handsome features. He stroked his own sizable proboscis.

"Why," she said, "is a beak nose a badge of birth in far Nich-Nyamadze? With us 'tis the contrary; the flatter the nobler, wherefore have I ever in my companions' laughter read mockery for my base-born looks. Perchance should I remove to this cold clime of yours, where my ugliness by the alchemy of social custom might to beauty be transmuted."

"Ugliness!" said Barnevelt, and was thinking up a neat compliment when Zakkomir broke in:

"Less female self-appraisal, madam, and more attention to your game. As the great Kurdé remarked, beauty of thought and deed outlasts that of skin and bone, be the latter never so seductive."

"And not pleased am I to hear our customs made light of," growled Queen Alvandi. "Such mental mirror-posturing is meet for vain and silly males, but not for one of the stronger sex."

As Zéi, looking a bit cowed, returned to her game, Zakkomir turned to Barnevelt. "General Snyol—Oh, General Snyol!"

Barnevelt had fallen into a trance watching Zéi, and woke up with a

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start. "Huh? Beg pardon?"

"Tell me, sir, how go your preparations for the gvám-hunt?"

"Mostly done. There's actually little left but to pay our bills, choose our crew, and oversee the overhaul of the ship."

"I'm tempted to cast my lot with you," said Zakkomir. "Long have I lusted for such adventure—"

"That you shall not!" cried the queen. "'Tis much too perilous for one of your sex, and as your guardian I forbid it. Nor would it look well for one so near the royal house to engage in this disreputable traffic. Kádj, you scurvy scrowl, my move to block! Would we could advance the festival's date to one earlier than that dictated by conjunction astrological."

Barnevelt was just as glad of the queen's interference. Zakkomir might be all right under his lipstick, but it wouldn't do to have strangers cutting in on the deal, especially as the expedition was not what it seemed.

"In truth," said Zéi, "the dangers of the Banjao Sea are not to be undertaken in a spirit of frivolity. Could we persuade you two to give up this rash enterprise, sirs, high place could be found for you in our armed service, which being sore disordered at the moment needs captains of your renown to officer it."

"What's this?" said Tangaloa.

The queen answered: "My foolish lady warriors protest the men won't wed 'em for divers reasons, all addlepated; plus factional quarrels 'mongst the several units and insubordinate jealousy amongst the officers . . . oh, 'tis a long and heavy-footed tale. The upshot is, I must bend my principles to the winds of human weakness and hire a male general to knock some silly crowns together. And as such employ to our own men is forbidden, I must seek my leader from foreign lands, however such choice may grate upon our pride. Do you perceive my meaning?"

King Kádj, who seldom got a word in edgewise, spoke up: "How soon will you depart, my masters?"

"Not soon enough to avail you!" snapped Alvandi. "I see how blows the breeze, my friends. He'll think to seduce you into leaving early, having smuggled himself aboard in the guise of a sack of tabid-tubers, and so provoke the righteous wrath of the Mother Goddess by evading the just price of his year's suzerainty. Know, sirs, you had better watch your respective steps, for this day have I signed the death-warrants of three miserable males who sought unauthorized to slip from the land, no doubt to join the free-booters of the Sunqar. As for this aging idiot of mine—"

Kádj stood up, shouting: "Enough, strumpet! If my remaining time be short, at least spare me your sluttish yap! Get you the astrologer to finish the game for me."

He stalked from the room.

"Bawbling dotard!" the queen yelled after him, then beckoned a flunky and bid him fetch the court astrologer. She said to Zéi: "Find you young consorts, Daughter. These

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old ones like yon allicholy neither give pleasure in life nor prove toothsome when dead."

Barnevelt said: "You mean you *eat* him?"

"Certes; 'tis a traditional part of the kashyó festival. Do you attend, I'll see you're served a prime juicy gobbet."

Barnevelt shuddered. Tangaloa, taking the news quite calmly, murmured something about the customs of the Aztecs.

Zéi's rich lips had been pressed together ever since the departure of Kádj. Now she burst out: "Never will I have friends of mine to these family gatherings again! These travelers must deem us utter barbarians—"

"Who are you to reprehend your elders?" roared the queen. "Sirs, but a ten-night past was she who speaks so nice one of a rout of young revelers who, instigated by this buffoon her adoptious brother"—she indicated Zakkomir—"did strip themselves and mount the central fountain in the palace park, as they were the group of statues Panjakú means to set there. I had a lord and lady from Balhíb, of oldest family, to walk in the park. So, say they, be this the great sculptor's new group, which we thought not yet completed? And whilst I stood a-goggle, wondering if 'twere a joke my minions had played upon me, the statues leap to life and cast themselves about us, loathly wet, with many unseemly jape and jest—"

"Quiet!" yelled Zakkomir, asserting himself suddenly. "If you women cease not from this eternal haver, I shall be driven forth even as poor Kádj. There was no harm in our acture; your Balhíbo lord did laugh with the rest when he got over his initial fright. Now let's talk of more delightsome things. General Snyol, how escaped you from the torture-vaults of the Kangandites when they for heresy had doomed you?"

Barnevelt looked blankly at his questioner. The real Synol of Pleshch must have been a Nich-Nyami general who had fallen afoul of the official religion of that country. After some thought he said:

"I'm sorry, but I can't tell without endangering those who helped me."

At that instant the court astrologer came in. Barnevelt sighed with relief at the interruption of another embarrassing line of conversation. The astrologer, an old codger introduced as Qvansel, said:

"You must let me show you the horoscope I have worked out for you, General Snyol. Long have I followed your career, and all has come about as predetermined by the luminaries of heaven, even unto your arrival today at Qiríb's capital and court."

"Very interesting," said Barnevelt. If only, he thought, he could tell the old boy how wrong he was! The astrologer went on:

"In addition, sir, I should a favor deem it if your teeth you'd let me scrutinize."

"My teeth?"

"Yes, for if I may say I am the

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kingdom's leading dentist."

"Thanks, but I haven't got a toothache."

The astrologer's atennae rose. "I know nought of toothaches or the cure thereof! I would tell your character and destiny from your teeth: a science second in exactitude only to the royal ology of the stars itself."

Barnevelt promised himself that if he ever did have a toothache he wouldn't go to a dentist who examined his patient's teeth to tell their fortunes.

"Master Snyol!" barked the queen. "Your turn, as in truth you'd know were your eyes upon the game and not upon my daughter. Has she not the usual number of heads?"

They were invited back two nights later, and again the night after that. On these occasions Barnevelt was pleased to find that they did not have to put up with the morose king and the ferocious queen. It was just Zéi, Zakkomir, and their young friends. Cautious questions bearing on the janrú traffic and Shtain's disappearance elicited nothing new.

Barnevelt wondered why he and George should be taken into such sudden favor at the palace. He was under the impression that royalty was choosy about its intimates, and he did not flatter himself that with his modest command of the language he had swept them off their feet by force of personality alone. Although George was socially more at ease than he, nevertheless they gave Barnevelt more attention than they did his companion.

Barnevelt finally concluded that it was a combination of factors. The social leaders of this remote city were bored with each other's company and welcome a couple of exotic and glamorous strangers, arriving with impressive credentials, whom they could show off to their friends. They—especially the hero-worshiping Zakkomir—were impressed by the achievements of the supposed Snyol of Pleshch. And finally Zéi and Alvandi were serious about hiring him.

He found the gilded youth of Ghulindé pleasant on the whole; idle and useless by his sterner standards, but friendly and charming withal. From the chatter he gathered that there were wild ones of this class as well, but such were not welcomed at the palace. Zakkomir, in his anomalous position as ward of the throne, seemed to pick the social list and to serve as a link between the outside world and Zéi, who gave the impression of leading a somewhat shut-in life.

Barnevelt noticed that the princess became much livelier when her mother was not around—almost boistrous in fact. Perhaps, he thought sympathetically, she had a problem like his own.

Then something else began to worry him: He caught himself more and more stealing glances at Zéi, thinking about her when he was away from the palace, and looking forward to seeing her again on his

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next visit. Moreover they seemed to mesh spiritually. During the frequent arguments he more and more found her and himself on the same side against the rest. (Tangaloa disdained to argue, regarding the whole spectacle with detached amusement, and making sociological notes on the conversations in his König & Das notebook when he got home at night.)

After several visits Barnevelt even felt close enough to Zéi to fight with her openly. One night he beat her by a narrow margin at Chinese checkers, having nosed her out by a blocking move. She said some Gozashtandou words that he did not suspect her of knowing—unless she had learned them from Philo.

"Now, now," he said, "no use getting riled up, my dear. If you'd watched what I was doing instead of gossiping about the spotted egg Lady Whoozis has laid, you'd—"

Wham! Zéi snatched up the game board and brought it down smartly on Barnevelt's head. As it was of good solid wood, not Earthly cardboard, and as he had no hair to cushion the blow, he saw stars.

"So much for your criticisms, Master Know-it-all Snyol!"

Barnevelt reached around and gave her a resounding spank.

"Ao!" she cried. "That hurt! Such presumtuous jocosity, sirrah—"

"So did your game board, madam, and I'm in the habit of doing to others as they do to me, and preferably first. Now shall we pick up the little balls and start again?"

Seeing that the others were more amused than indignant, Zéi cooled off and took the slap in good part. But when Barnevelt had bidden her a ceremonious good night at the door and turned to go, he got a terrific swat on the seat of his shorts that almost knocked him sprawling. He turned to see Zéi holding a broom and Zakkomir rolling on the rug with mirth.

"The last laugh is oft the lustiest, as says Néhavend," she said sweetly. "Good night, sirs, and forget not the way back hither."

Dirk Barnevelt had been in love before, even though his mother had always managed to spoil it. He was not altogether foolish about such matters, though, and saw that nothing would be more tragically ridiculous than to fall in love with a female of another species. And one, moreover, who disposed of successive mates in the fashion of an Earthly spider or praying-mantis.

Barnevelt worked hard on his crew, molding them into an effective unit. Knowing that his own shyness sometimes made him seem aloof and cold to those who did not know him well, he made a point of being chummy with the sailors, who seemed delighted that one of his rank should admit them to such unwonted familiarity.

After a day of training the crew in the harbor, the Earthmen's next visit to the palace found only Zéi and Zakkomir visible, though the queen looked in once to bid a curt good eve-

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ning. The king appeared not at all.

"He's drunk, poor abject," said Zakkomir. "So should I be in his buskins. Of late he spends all his time in his chambers swilling and pottering with his collection of cigar cases. A rare assortment has he, too; marvels of jeweling and fine inlay-work, and trick ensamples like one that plays a tune when you open it."

"Could I see them?" said Tangaloa.

"Certes, Master Tagde; 'twould pleasure the old fellow greatly. Showing off this accumulation is nearly his only joy in life, and few chances he gets, for the queen scoffs at his enthusiasm and visitors cloak themselves in simular agreement with her attitude to flatter her. You'll excuse us, sir and madam, unless you also wish to come?"

"Let's not and say we did," said Barnevelt. The other two males strolled out.

"How soon do you sail?" asked Zéi.

Barnevelt, feeling oddly breathless, replied: "We could be off day after tomorrow."

"You must not leave ere the kashyó festival be over! We have reserved for you a pair of choicest seats, next in honor after our royal kin."

Barnevelt answered: "It may seem uncouth of me, but watching your poor old stepfather butchered is a sight I could bear to miss."

She hesitated, then said: "Is't true we're criticized in other lands because of it, as says Zakkomir?"

"Matter of fact, some folks are horrified."

"So says he, but I doubted because he's a secret sympathizer with the Reform Party."

"The people who don't want to kill the king any more?"

"The same. Breathe nothing to my lady mother, lest in her rage poor Zakkomir suffer. They sent word to her through intermediaries that for the nonce they'd settle on elimination of the ceremonial devourment of the late consort. But she'd have none of it, and so beneath its fair-seeming surface does our land boil with treasonous plots and coils."

"What'll you do when you're queen?"

"That I know not. Though sensible am I of the causes urged against our custom, yet will my mother always retain much influence on the affairs of Qiríb, so long as she does live. And, as she says, aside from considerations of true religion, there is nothing like slaying the topmost man yearly to keep the sex in its proper place."

"Depends on what you call proper place," said Barnevelt, thinking that Qiríb needed—what would be the opposite of "feminist"? "masculist"?—a Masculist Party.

"Nay," said Zéi, "argue not like Zakkomir. Our realm's prosperity is proof positive of the rightful superiority of the female."

"But I can cite you prosperous realms where the men ruled the women, and others where they were equal."

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"A disturbing fellow, are you not? As I said when you so rudely smote me upon the posterior, no Qiríbu you!"

"Well, my disturbing presence will soon be gone. Actually, you can give me some useful advice. What's the connection between the Banjao pirates, the janrú traffic, and Qiríb?"

She stared at her cigar. "Methinks we'd best change subjects, lest we get into grounds perilous where one's safety can only be assured by another's sacrifice—"

On the way home, Barnevelt said: "Let's shove off day after tomorrow, George."

"Are you mad? I wouldn't miss this ceremony for anything. Think of all the dinkum film we shall get!"

"Ayuh, but I'm squeamish about watching them kill and cook poor Kádj in front of my eyes. To say nothing of having to eat a piece of him later."

"How do you know what he will taste like? Among my ancestors it was a regular custom for the winner of a sporting contest to eat the loser."

"But I'm no South Sea Islander! In my culture-pattern it's considered rude to eat people you know socially."

"Come, come," said Tangaloa. "Kádj is not really human. Millions of Krishnans die all the time, and what difference does one more make?"

"Yes, but—"

"And we can't walk out on the queen. She expects us."

"Oh, foof! Once we're at sea—"

"You forget we're leaving a bond here, and Panagopoulos won't stand for our forfeiting it unnecessarily. Also our sailors will insist on being brought back home when we finish."

Unaccustomed as he had become to having George make a definite decision, Barnevelt gave in. He told himself he did so because of the weight of Tangaloa's arguments—*not* because he would thus be enabled to go on seeing Zéi. Nevertheless he felt elated at the prospect of so doing.

The night of the festival Zakkomir checked the costumes of Barnevelt and Tangaloa and found them adequate. "Though," he said, "they be not those customary, yet will the other practisants excuse you as foreigners who know no better."

"Thank Zeus they won't make us wear one of those toga effects," muttered Barnevelt. "I can just see myself trying to manage one in a gale."

Not Solomon in all his glory was arrayed like Zakkomir, in a sort of cloth-of-gold sarong, with jeweled armlets, gilt sandal-boots reaching halfway up his bare calves, a gold wreath on his green hair, and his face as bedizened with pain as that of a Russian ballerina.

He led them into the reception hall where royal aunts and uncles thronged. At last the trumpets blew and the king and queen marched through, the rest falling into place behind them. Kádj wobbled as he walked and looked glummer than ever, despite the efforts of the royal make-up artist to paint a lusty look

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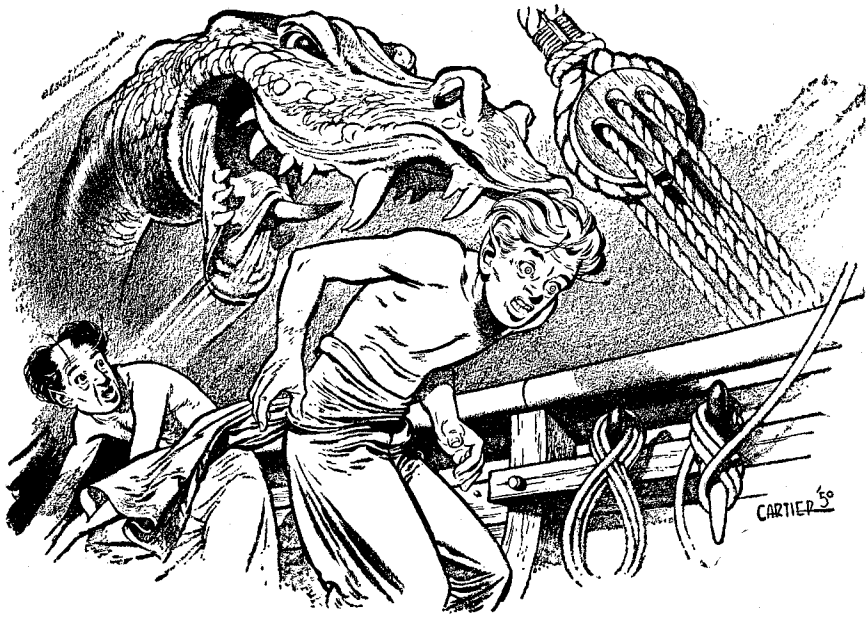

upon his visage.

Zakkomir showed Barnevelt and Tangaloa where to fall in, then went forward to take Zéi's arm behind the royal couple.

As the amphitheater where the kashyó festival took place lay just outside the palace grounds, the procession went afoot. Two of the three moons showed alternately as the clouds uncovered them, and a warm brisk wind flapped robes and cloaks and made the gaslights flutter. Outside the wall of the palace grounds many of the common people of Ghulindé stood massed, and a wedge of whifflers pushed a path through them.

The amphitheater was fast filling. On one side stood the royal box. The flat space in the middle of the structure was occupied by a stove and a new red-painted chopping block. The people ranged about these accessories included old Sehri, the high priestess of the Mother Goddess; several assistants, some with musical instruments; the palace chef and a couple of assistant cooks; and a man wearing a black bag with eyeholes over his head and leaning on the handle of a chopper with a blade like a butcher's cleaver but twice as big. The cooks were sharpening other culinary implements. Amazon guards stood around the topmost tier of the theater, the wavering gaslights sparkling on their brazen armor.

Barnevelt found himself sitting in the second row a little to the right of the royal box, which was full of royal cousins besides the queen and the

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princess. The benches included a narrow tablelike structure in front of each. Kádj himself was down in the central plaza, sitting hunched on the chopping block with hands on knees.

Barnevelt said to Tangaloa: "I don't see how Kádj can be stretched enough to give everybody a piece, unless they make hamburger of him and dilute it with more conventional meat. What else happens?"

"It's quite elaborate; they have ballet-dancers acting out the return of the sun from the south, and the growing crops and all that sort of rot. You will like it."

Barnevelt doubted that, but as the amphitheater was now full and the crowd quieting down he did not care to argue the point. The high priestess raised her arms and called out:

"We shall first sing the hymn to the Mother Goddess: 'Hail to Thee, Divine Progenitrix of Gods and Men.' Are you ready?"

She swept her arms in the motions of an orchestra conductor. The musical instruments tweetled and plunked, and the audience broke into song. They sang lustily for the first few lines, then petered out. Barnevelt noticed that many were peering about as though trying to read their neighbors' lips, and guessed that, as in the case of "The Star Spangled Banner" and the "World Federation Anthem" a lot of people knew the words of the opening lines only. Tangaloa was unobtrusively filming the scene with his ring-camera.

As the volume of singing diminished, Barnevelt heard another sound that swelled to take its place: the surflike noise of a distant human uproar. At the end of the first stanza the priestess paused with her arms up. In the resulting silence the noise came nearer, resolving itself into individual roars and shrieks and the clang of metal. Heads turned; in the topmost tier some stood up to stare outward. Amazons bustled about and conferred.

Barnevelt exchanged a blank look with Tangaloa. The sound grew louder.

Then a bloody man dashed into the theater through a tunnel entrance, shouting: *"Moryá Sunqaruma!"*

Barnevelt understood, then, that the noise was caused by an attack of the pirates of the Sunqar.

The next minute he was pitched off his feet by a panic-push of the crowd. He fought his way upright again. In front of him Tangaloa gripped a corner of the royal box to keep from being swept away.

A renewed racket around one of the entrances, and a party of pirates pushed in against the opposition of the Amazons. Barnevelt saw some woman warriors go down before the weapons of the intruders, and others brushed aside. More pirates irrupted through other entrances. Barnevelt felt for his sword, then remembered that he had been made to leave it at home. The Qiríbo men were all unarmed, and while some of the women wore swords neither they nor the men seemed inclined to make

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use of them.

A pirate with a torch in one hand and a sheet of paper in the other shouted in the Qiríbo dialect: "Stand! If you flee not, no harm shall come to you. We wish but two men from among you." He repeated this announcement until the hubbub quieted.

Other shouts came from outside. Barnevelt guessed that the pirates had thrown a cordon around the theater to catch runaways. He also had a horrid premonition of who the two sought by the raiders were.

Queen Alvandi and Princess Zéi stood in their box, pale but resolute.

The bulk of the audience were still massed around the exits. In the center of the theater the cook, the executioner, and most of the priestesses had disappeared into the general mob; King Kádj and the high priestess remained.

The pirate leader with the torch shouted: "We wish—"

And at that instant the gaslights went out.

The sudden darkening brought a few seconds of silence; then a rising murmur that swelled to a roar.

"Snyol! You there, Snyol of Plenshch!" shouted a voice.

Barnevelt looked around. A few meters away from him stood King Kádj, revealed by the fugitive light from one of the moons. The king bore a triumphant smile on his face and the executioner's chopper in his hands.

"Yes, you!" repeated the king. "Take the queen to the palace, and let your companion Tagde take the princess!"

"How about you?" Barnevelt shouted back.

"I remain here. To me, all loyal Qiríbuma! To me! Let's deracinate this ging of rogues!"

"I'm with you!" came the Zakkomir's high voice, and the young man jumped down from the front of the box with a lady's sword in his hand. A few of the braver citizens joined them, and the remnant of the Amazon guard. With the king whirling the chopper at their head they bored into the scattered pirates. The clatter of weapons drowned speech.

Barnevelt, looking around, saw Tangaloa swarming up into the royal box, seizing Zéi, and starting to hustle her off out through the private royal exit. Although Barnevelt would have preferred that job himself, he saw nothing to do but carry out the king's order. He climbed up after Tangaloa and caught the queen's arm.

"Come along, your altitude," he said.

"But you . . . he—"

"Save the talk till later."

"I'll not come until—"

Barnevelt drew the queen's sword, a toylike little sticker, but at least it had a point. "You'll come or I'll spank you with this!"

They trotted down the tunnel through which the royal aunts and cousins had already fled. Outside, the seizure and search that the pirates had so carefully organized was

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fast breaking down with the extinction of the lights. People were running away in all directions, and here and there men fought with swords and pikes in the gloom. A Qiríbo gentleman mistook Barnevelt for a pirate and came at him. Barnevelt parried the first lunge and a yell from the queen enlightened the man in the midst of a second.

Another character with a torch confronted them, saying: "Halt! Ah, 'tis he whom—"

It was the specialist, Gavao bad-Gargan.

Barnevelt's point got him through the belly at that juncture. He doubled over and fell, dropping the torch. Then Barnevelt was engaged with another. The pirate lunged. Barnevelt parried and felt his point go home on the riposte. But the pirate, instead of falling, came back for more. You could never be sure of hitting a vital organ on a Krishnan unless you knew their distinctive physiology.

"Heroun, you devil!" shrieked the queen, apparently at the pirate.

"We'll argue later, you mangy trull!" panted the pirate, coming at Dirk.

They were still at it when another Qiríbu got the pirate over the head from behind with a small statue. *Splush!*

Somewhere a trumpet blew a complicated pattern of notes. The crowd had now pretty well thinned out, and the Sunqaruma, too, seemed to have gone elsewhere. Barnevelt saw a couple in the distance, running back down the colossal stairway that led from Ghulindé down to Damovang and the sea. He stepped over a body lying on the path, then over another that still moved. An occasional groan from the darkness around the shrubbery told of others left wounded.

At the front entrance to the palace a cluster of Amazons formed a double semicircular rank around the portal, those in front kneeling and those behind standing, their spears jutting out like a porcupine's quills. At a word from the queen they opened to let her through.

"Saw you my daughter?" she asked the guard in charge.

"No, my lady."

Barnevelt said: "I'll go back and look for her, Queen."

"Go, and take a few of these with you. We need them not all now the rovers have withdrawn."

Barnevelt led a half-dozen of the girl soldiers back the way he had come. One of them carried a small lamp. He stumbled over a body or two and met only one person, who fled before he could be identified. The accouterments of the girls clanked behind Barnevelt. He was sure he had got lost and was casting about for directions when a small twinkle, as of a fallen star, caught his eye.

He hurried over and found the bodies of the two pirates he had sworded. Beside them lay Gavao's torch, nearly out but putting forth one feeble tongue of flame.

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The moonlight also showed Barnevelt a white square on the path. He picked up a piece of paper about a span long and wide and turned it over. The other side was dark.

"Lend me that lamp, please," he said, and by the weak light of its flame examined the paper.

It was a print of the picture the old photographer had made of him and Tangaloa in Djazmurian.

He tucked the picture inside his jacket, thinking: A good thing the queen hadn't known the Moryá Sunqaruma were after George and himself, or she'd have surely turned them over.

"George!" he called into the darkness. "Tagde of Vyutr! George Tangaloa!"

"Be that my lord Snyol?" called a voice, and footsteps and clankings approached. However it was not George Tangaloa but Zakkomir bad-Gurshmani, limping, with a small party including a couple of Amazons.

"Where's the king?" asked Barnevelt.

"Slain in the garboil, and thus, while he evaded not the doom marked out for him in the stars, at least he came to a happier end than that which gallowed him. The queen'll be wroth, howsomever."

"Why?"

"Because, it spoils her ceremony; and 'twil strengthen the sentiment of the vulgar for male equality. 'Twas another male, the palace janitor, whose quick wit led him to shut off the gas. Moreover Kádj knew what he was about; after he'd struck down twain of the robbers, he said to me: 'Do we win here, we'll next deal with the old she-eshuna,' by which I think he meant the queen and Priestess Sehri. And then a pirate blade did jugulate him as he pivoted. But enough of that; where are your friend and the princess?"

"I'm wondering," said Barnevelt, and called again.

The party spread out to search. After much poking among the bushes an Amazon called: "Here lies one without hair upon his pate!"

Barnevelt hurried over and found that sure enough it was Tangaloa asprawl on his face, his shaven scalp puffed into a bloody lump over one ear. To his infinite relief Barnevelt found that George's pulse was still beating. When an Amazon dashed a helmetful of fountain water into Tangaloa's face he opened his eyes and groaned. His right arm was also bloody; he had been run through the muscle.

"What happened?" said Barnevelt; "Where's Zéi?" And Zakkomir echoed him.

"I don't know. I told you I was a dub at swordplay. I hit one bloke over the head, but the sheila's sword broke on his helmet and I don't remember any more."

"Serves you justly," muttered Zakkomir when this had been translated, "to use a light thrusting blade in such thwart fashion. But where's our princess?"

"Let me think," said Tangaloa, putting his left hand to his head.

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"Just before that happened, one of 'em grabbed her, and another shouted something about taking 'em both—everybody was yelling at once. That's all I know."

"'Tis enough," said Zakkomir. "For from this can we infer they've seized her. Mushái, run to the top of the theater and see if all their ships have left their mooring. If not, there might be yet time—"

But Mushái called down in a couple of minutes that the fleet of the Moryá Sunqaruma was now all well out to sea.

VIII.

The queen was wild. "Cowards!" she screamed. "I should let slay the whole mangy pack of you—and you detestable strangers, too!" she added, indicating Barnevelt and Tangaloa, the latter of whom was having his arm bandaged. "For what's a monarchy without a monarch, save a worthless rabble, and what's a monarch whose subjects will not spend their blood to save her? Caitiff knaves, all my subjects! Burn the lot! Why should they live when my chick's gone?"

"Now, now," said Qvansel the astrologer. "Your altitude, what had happened was writ upon the firmament and not to be avoided. The opposition of Sheb to Roqir did presage—"

"Shut your mouth! Enough time for star-gazing foolery when my girl's recovered. "You, madam!" Queen Alvandi shot a thick forefinger at her spinsterly minister. "How account you for this arrant botchery?"

"Madam, may I speak without fear?"

"Say on," said the queen, though her angry lioness expression did not invite candor.

"Then hear me, awesomeness. What happened was predestined, though not for the reason given by our star-staring friend. For five reigns now has the right to bear arms in this land been limited to our own sex female. Hence have your subjects male become unused to the shock of combat, while your armed females, though valiant enough, lack the size and stoutness to endure the onslaught of these rampant depredators."

The queen glowered. "'Tis well you extracted from me a promise of immunity, or would I tear the flesh from your aged bones myself for your treasonous talk! But let's consider what is to be done. And no counsel of overturning the basis of our state, either! I'll see Ghulindé razed to the ground and the heads of its people piled in pyramids before I'll put out the beacon-light our state does shed upon this sorry world by the exaltation of the better sex to its proper seat. How about an expedition to rescue her?"

"Could be," said the minister, "save that the Sunqaruma no doubt entertain some plan of holding Zéi for hostageship or ransom, and would slay her should you press attack upon them."

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The high priestess, Sehri, muttered something about expense, and the chief of the Amazon guards protested: "Though we yield to no mere males in intrepidity, your altitude, yet is the Sunqar a fearsome place to overcome, as it can neither be walked over nor sailed through. Methinks that the occasion cries more for guile than brute puissance."

"Guile?" said the queen, looking from face to face. "As, let us say, to slip a small group into this steamy stronghold on some fair-seeming pretext, and then away to snatch my daughter?" Her small glittering eyes came to rest on Barnevelt. "You, sir, come hither claiming you'll seek the gvám-stone in the Banjao Sea to inflame the lust of lechers. You buy a suitable ship, amass gvám-hunting gear, and hire men—and also, my spies report, procure one used expressman's uniform. Now wherefore this last? Could it be that you twain also entertain some plot the Sunqar in disguise to enter?"

No flies on Alvandi, thought Barnevelt, giving the queen a noncommittal smile. "One never knows when such a thing will come in handy, your altitude."

"Humph! I take your evasion for assent. So, since you wish it, you shall do it. You are hereby commissioned to rescue the princess from the clutch of these misdemeanants."

"Hey!" cried Barnevelt. "I never volunteered for anything like that!"

"Who said you did? 'Tis my command and your obedience. You leave on the morrow."

"But I couldn't even think of going without Ge . . . my friend Tagde, and he won't be ready till his arm heals!"

"Such delay might well be fatal. I'll lend you Zakkomir in his stead."

"I shall be glad to go," said Zakkomir. " 'Twould be an honor to serve under the great Snyol."

Barnevelt scowled at the young Krishnan, then addressed the queen again: "Look here, madam, I'm not a citizen of Qiríb. What's to stop me from going about my own business as soon as I'm out of your country?"

"The facts that, first, Snyol of Pleshch is known as one who keeps his plighted word; and second, that your companion remains with me as hostage, your acquiescence to assure. *Guards!* Seize these twain, and fetch the executioner with his instruments of torment."

A couple of Amazons seized Dirk's arms. He struggled, but they were strong, and before he overcame his Earthly inhibitions against kicking a lady in the abdomen, more fastened onto him until he could not move at all. Others seized Tangaloa, who did not even try to resist.

Presently the man with the bag over his head appeared with a brazier full of hot coals, in which the business ends of an assortment of pincers and other instruments of interesting design were beating.

"Now," said Queen Alvandi, "do you submit, or must I stage a painful demonstration of my will?"

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"Oh, I'll go," grumbled Barnevelt. "But if you want me to accomplish anything, tell me about the Sunqar. There's some connection between it and the janrú trade and Qiríb, isn't there? You knew one of the men I was fighting with."

"He's right, exalted guardian," said Zakkomir. "This foray will prove perilous enough without sending this mighty man against his foes half-blind by ignorance."

"Very well," said the queen. "Release them, guards, but watch them close. Sit, my friends.

"Know that the janrú is but an extract made from that same sea vine of which the Sunqar is composed. And since the founding of the matriarchal monarchy, because that nature had unequitably made my sex the smaller, have we redressed the balance by the use of perfume mingled with this volatile essence called janrú. 'Tis not broadcast among the general, but any wench whose man develops fractiousness can draw a ration of it from the temple of the Mother Goddess, her churlish spouse to tame.

"The foundress of the dynasty, great Dejanai, did organize a party to invade the Sunqar, then a watery and weedy desert, to erect a floating factory the stuff to make. All went as planned, save that our women, caring not for heat and damp and stench, the work came more and more to be performed by convicts exiled to this lonesome spot to expiate their crimes. In time the men outnumbered women two to one, whereat some base subversive rebel stirred the silly males to rise by tempting them with tales of male superiority among the savage nations. So rise they did and seized the factory. Our navy they repelled, and from us did extort a tribute in return for a meager trickle of janrú. We tried by gathering terpahla that grows on rocks along our coasts, to free ourselves from their rapacity; but only in the Sunqar does the vine occur in quantities sufficient.

"Since then the Sunqar has continued to defy us. Not only does it squeeze us juiceless for this wondrous substance, but serves as sanctuary for our malcontented males. Hence has its population grown, and divaricated into other lines of enterprise: for ensample, gvám-hunting and plain piracy. In the days of my immediate predecessor did a chief named 'Avasp make a deal with Dur, whereby Dur did pay him tribute on his agreement to withhold his hand from Duro shops, but on all others in the Banjao Sea most balefully to prey. Thus does Dur reach out for a monopoly, not only in its own Va'andao Sea, but in the other waters of this hemisphere as well.

"All sorts of curious characters have assembled in this fearsome fastness: not only discontented Qiríbuma, but also tailed men from Zá and the Koloft Swamp, and even Ertsuma and other creatures from the deeps of space. When 'Avasp died, the new chief chosen in his room was one of these—a scaly, odious horror from a planet called

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Osiris: a towering monstrosity named Sheafasè who, 'tis said, maintains a rule of iron by a dreadful power of fascination. And this Sheafasè had far and wide outspread the tentacles of enterprise, until he does amass the wealth of Dahhaq by the drug to Earthmen selling—"

Despite the queen's harrying, they did not sail the next day, nor yet the day after that.

For one thing, half the crew disappeared when they learned the real object of the expedition, so that new men had to be signed on and broken in. One of these, a bright young fellow named Zanzir, followed Barnevelt around asking questions. Barnevelt, flattered, gave the youth a good deal of his time until Tangaloa warned him against favoritism. Thereafter Barnevelt tried to treat the others with equal cordiality.

He also hired a new boatswain, Chask: a thickset, gnarly, snag-toothed man with his green hair faded to pale jade. Chask took hold of the crew and soon welded them into an effective rowing and sailing unit. All went well until one day while Barnevelt was in the cabin and the men were practicing evolutions on deck, he heard the sound of a scuffle. He went out to find Chask nursing a knuckle on the catwalk and Zanzir a bloody nose in the scuppers.

"Come here," he said to Chask. When the latter was in the cabin he gave him a dressing-down: "My crew are to be treated like human beings, see? There shall be *no* brutality on my ship."

"But, captain, this young fellow disputes my commands, saying he knows better than I how to do what I've spent my life—"

"Zanzir's an intelligent boy. He's to be encouraged rather than suppressed. You're not afraid he'll take your job away, are you?"

"But, sir, with all respect, ye cannot run a ship like a social club, with all entitled to a voice in deciding each maneuver. And if those in command let common sailors think they're as good as them, and entitled each order to discuss, then when comes the pinch—"

Despite inner qualms, Barnevelt felt he must show a firm front. "You have your order, Chask. We're running this ship my way."

Chask went out muttering. Thereafter the sailors seemed happier but also less efficient.

When the *Shambor* finally put forth from the harbor of Damovang with Barnevelt and Zakkomir aboard —and Tangaloa, surrounded by Amazons, waving his good arm from the pier—Barnevelt had accumulated several items of special equipment which, he hoped, would somewhat ease his task. There were smoke bombs made by a local manufacturer of pyrotechnics, and a light sword with a hinge in the middle of the blade so that it could be folded and slipped down inside one of the expressman's boots. As a weapon it was inferior to a regular rapier, the hinge constituting a weak spot and the hilt lacking a proper guard, but Barnevelt doubted

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that the pirates would admit him to their inner circle fully armed.

He also bore a chest of gold and gewgaws as a present from Queen Alvandi to Sheafasè, and a letter asking for terms for Zéi's release. A Krishnan quadrant, simple but rugged and fairly accurate, would give him his latitudes.

Zakkomir, looking quite different without his face-paint, waved a similar sticker, saying: "My lord Snyol, will you teach me to wield a sword in practiced style? For under our laws have I never had a chance for such instruction. 'Twas simple happenstance I wasn't spitted during the raid. Ever have I nursed a perverse wish to be a woman—that is, not like the women of your land, or the men of mine, but a woman of mine, and to swear and swagger with rough muliebrity. Would I'd been hatched in your land, where custom to the male such part assigns!"

At least, thought Barnevelt, the kid's willing to learn.

The first leg of the trip was easy, for they ran free before the prevailing westerly along the coast of the Qiribo peninsula, where dark stunted trees overhung rocky promontories on which the spray broke. Zakkomir had a couple of days of seasickness, then snapped out of it. They stopped at Hodjur to top off supplies.

Barnevelt studied his navigational guide and familiarized himself with the workings of the *Shambor*. Not far in the future all three moons would be in conjunction at full, which

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meant a real high tide—something that occurred only once in several Krishnan years.

In hull and rudder the ship compared well with the yachts he'd sailed on Earth. The sail, though, was something else: a lateen sail of the high-peaked asymmetrical type used in these waters, in contrast to the symmetrical lateen sail of Madjbur and the lug and square sails of the more boisterous northern seas. He learned that a lateen sail, however pretty, had but weak powers of working to windward. In fact, it combined many of the disadvantages of a square sail and a fore-and-aft sail with few of the advantages of either.

Chask explained: "Captain, there do be six ways of tacking with a lateen sail, all impractical. Now, had we one of them Madjburo rigs, with the two short sides equal, we could pay out the tack and haul in the vang, so that the low corner rises and the high one falls, meanwhile wearing ship. But with this rig must ye either lower sail altogether and re-rig on t'other side of the mast, or put half the man on the tack and haul aft to up-end the yard and twist it round the mast. Still, in the region of variables and calm whither we're bound, that high peak'll prove its worth in catching light airs."

At last they reached the end of the peninsula, where the Zogha sloped down to the sea like the spinal scutes of some stegosaurine monster. They turned to starboard and headed south with the wind abeam. Barnevelt gave his men only an occasional turn at the oars, enough to keep them hardened but not enough to tire them. He'd need their strength later. The water was too rough for effective rowing anyway.

Then the emerald waters turned to slate, the wind fell, and they spent a day rowing in a fog through which a warm drizzle fell unceasingly. They spread a canvas tank to catch the rain for drinking water.

Barnevelt was standing in the eyes of the ship, peering into the mist, when the *Shambor* lurched suddenly as if she had struck bottom. Yells rose from the men aft.

On the port side of the ship, in the water, an elongated body was moving away. It might have been part of the barrel of a finback whale or a sea serpent, and seemed to be covered with flint-gray leather. As it slipped through the water, the particular coil or loop that was arched up next to the ship sank down out of sight.

A scream jerked Barnevelt's attention to the stern. There in mid-air, its means of support hidden by the fog, appeared a crocodilian head with jaws big enough to down a man at a gulp. The head tilted to one side and swooped down onto the deck, a colossal neck coming into view behind it. *Clomp!* went the jaws, and a screaming sailor was borne back into the mist.

Barnevelt, caught by surprise, did not spring into action until the victim was on his way into the sea. Then he caught up a spare oar and ran to the stern, but too late. The shrieks of the victim were cut off as the dreadful

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head disappeared beneath the water.

"Row!" yelled Chask, and the oarsemen dug in their blades.

Barnevelt unhappily gave orders to mount a deck watch with pikes in case of another such attack. He went back to the bow for a while, then started back for the deckhouse.

He was just opening the door when a shuffle of feet and a clearing of throats behind him made him look around. There were Zanzir and three other sailors.

Zanzir spoke up: "Captain Snyol, the boys and I have taken thought, and concluded that 'twere best for all if you now do turn back homeward."

"What?" cried Barnevelt, not sure he had heard right.

"Aye, so we've decided. It's not so, bullies?" The other three made the affirmative head-motion. "Some of us feel poorly in this drizzle; others have families at home. To press on through this ominous fog into a realm of uncharted rocks and bloodthirsty men—"

"And unknown deadly monsters, forget not," reminded one of the others.

"And unknown deadly monsters, like that which but now did snatch our comrade, were cruelty compounded. So we know that, being a good friend of ours—"

"Who admits we're as good as he," reminded the same prompter.

"Who admits we're as good as he, that ye'll heed our advice and return us to our happy homes. Is't not true, bullies?" And all three indicated "yes".

"No, I will not turn back," said Barnevelt. "You were warned at the start about our dangers, and now you shall see them through."

"But Cap old fellow," said Zanzir, laying a hand on Barnevelt's arm. "Between friends should there not be mutual trust and consideration? We've voted on it, and you're overborne by four to one—"

"Get back to your work!" said Barnevelt sharply, shaking off Zanzir's hand. "I'm boss, and by Qondyorr's rump I'll . . . I'll—"

"Ye mean ye won't?" said Zanzir with an air of pained astonishment. "Not even to please your friends?"

"Get out! Hey, *Chask!* Put these men to work and discipline the next one who talks of quitting."

The men went aft, glowering back at Barnevelt who, upset and angry, flung into the deckhouse to work out a dead reckoning plot. So that was what happened when you made pals of your men! All very fine while the going was good, but the minute the going got tough they were like a rope of sand. He'd heard it before, of course, but hadnt' believed it, supposing that theory to be mere self-justification by aristocrats and tyrants. Now they'd be sore, and not altogether without cause, for he'd led them to think they could have their way and then rudely disillusioned them.

"I like this not," said Zakkomir, peering palely out the cabin windows into the mist. "Varzai knows on which side of Palindos Strait we'll make landfall, if indeed we run not

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upon the rocks. Would there were some means of closely fixing one's position east and west."

Barnevelt looked up from the plot he was comparing with his chart, and almost said something about marine chronometers and radio signals before he remembered where he was. Instead he said:

"We're not due to reach the south shore of the Sadabao Sea for some hours yet. I'll slow down to take soundings before we get into dangerous waters."

"Let's hope you do, sir. We'd cut poor figures, setting forth with such brave impetus to save our damsel from disaster dire, only to find our immediate end in the maw of some monster maritime."

"Are you in love with Zéi?" Barnevelt asked with elaborate casualness, though his heart pounded as he said it.

Zakkomir forced a smile. "Nay, not I! From long acquaintance I regard her as a sister, and will lavish on the chick all brotherly affection. But love as between man and woman? To be the consort of a queen were difficult enough; to be that of one who's required by our customers to send her mate to death the end of year were quite impossible. The little Lady Mula"i, whom you've met at the palace, is my intended, if I can induce her to propose."

Barnevelt experienced a certain relief at this reply, thought he knew it was silly since *he* did not intend to marry Zéi. As he pondered his charts he became aware of a clicking sound, which he finally identified as the chattering of Zakkomir's teeth.

"Are you cold?" he asked.

"Nay, only f-frightened. I sought to hide my mannish weakness from you."

Barnevelt slapped him on the back. "Cheer up; we're all frightened at times."

"Why, have even you, the great and fearless General Snyol, known fear?"

"Sure! Don't you suppose I was scared when I fought those six fellows from Olñega singlehanded? Pull yourself together!"

Zakkomir pulled himself together, almost with an audible click, and Barnevelt continued his computations. When his dead reckoning showed they were getting close either to Palindos Strait or to the shores adjacent to it, Barnevelt gave orders to take soundings. The first attempt touched bottom at fourteen meters. Thereafter they went slowly until the water shoaled to five meters and they thought they could hear the sound of a small surf ahead. There they anchored until a brisk wind sprang up and blew the fog away in tatters.

"Said I not you were infallible?" cried Zakkomir, his courage regained.

Palindos Strait appeared in plain sight to the South and East of them. The strait was divided by the island of Fossanderan, the eastern or farther channel being the one used for navigation. The western channel was much smaller, and a note on Barne-

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velt's chart stated that its minimum depth was about two meters — too shallow for the *Shambor* unless tidal conditions were just right.

Zakkomir added: "What perplexes me is how you, a man from Nich-Nyamadze where no large bodies of water exist, should add such adroit seamanship to your many other accomplishments."

Barnevelt ignored this comment as they ran through the eastern channel, off the wind, at a good clip. Pointing to Fossanderan, Zakkomir said:

" 'Tis said that on that isle it was the hero Qarar mated with a sheyeki, and from their union came a race of beast-men with human limbs and animal heads. 'Tis yet reported that there these monsters still do riotous revels hold at certain astrological conjunctions, with din of drum and clash of cymbal making the long night hideous."

Barnevelt remembered the yeki he had seen in the zoo in Madjbur: a carnivore about the size of an Earthly tiger, but looking more like an oversized six-legged mink. "Why doesn't somebody land and find out?" he asked.

"Know you, sir, the thought never occurred to me? When this present task be over, who knows what we'll next essay? For under your inspiring leadership I feel brave enough to mate with a sheyeki myself."

The air grew warmer and more humid as they entered the belt between that of the prevailing westerlies and that of the northeast trades. Calms made them rely on oars alone for days at a time, and Barnevelt checked his supplies of food and water and worried.

Krishnan flying fish—which really flew with flaps of jointed wings, and did not merely glide like those of Earth—soared past the ship. Once Barnevelt sighted his nominal prey, a gvám, plowing whalishly after a school of lesser sea creatures and darting its barb-pointed tentacles at them to spear them and convey them to its maw.

Barnevelt said: "After one of those, the Sunqaruma don't seem at all terrible."

Floating patches of terpahla appeared more frequently, and then at last the jagged line of a fleet of derelicts on the horizon. As they came nearer the vine grew thicker until they had to zigzag through it. Somewhere in the haze ahead lay the stronghold of the Sunqar pirates. Probably Zéi was there, and possibly also Igor Shtain.

Presumably the Moryá Sunqaruma got in and out of their lair by an open channel. Although none of his informants had known where this channel was, it seemed to Barnevelt that he could probably find it by simply coasting along the edge of this floating continent.

Hence when they reached their first derelict—a primitive seagoing raft with a tattered sail flapping feebly in the faint breeze—they turned the *Shambor* to starboard and inched along to westward. To port

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the vine grew almost solid, brown slimy stuff supported by clusters of little purple gas-bladders that looked like grapes.

Looking over the side, Barnevelt saw a flash of motion. It was a spotted eellike creature, about as long as he was, swimming beside the *Shambor*.

"A *fondaq*," said Chask. "Their venomous bite is swift death, and they swarm hereabouts."

Barnevelt followed the creature's graceful motions with fascination.

After half a day of this Chask called into the cabin: "Ship ahead, sir."

Barnevelt came out. It seemed to be a galley, long and many-legged. The *Shambor's* crew muttered and pointed in the manner of frightened men. Barnevelt and Zakkomir went back into the cabin to put on their expressman's costumes, for the Krishnan had procured one, too. Zakkomir did not want to wear his vest of fine chain mail under his jacket, arguing speed and lightness, especially if they fell in the water. But Barnevelt insisted, adding: "Don't forget our new names. What's mine?"

"Gozzan, sir. And my lord: To you do I confess that terror's grip again lies heavy on my windpipe. Do I falter or flinch, strike me down before you let our plan miscarry on account of my despicable timidity."

"You're doing pretty well, son," said Barnevelt, and went out again.

As they neared the galley, Barnevelt saw that this ship lay just outside the mouth of the channel he sought into the interior of the Sunqar. A pair of cables ran from the stern down into a large mass of terpahla which at first seemed to be part of the Sunqar. As they came closer yet and heard the ratchety sound of a catapult being wound up, it transpired that the mass to which the galley was attached was separate from the rest. Barnevelt wondered if this mass of terpahla might not be kept there as a sort of floating plug for the channel, to be pulled into the mouth of this waterway as a defensive measure in case of attack.

The galley was a deck higher than the little *Shambor* and over twice as long—thirty or forty meters, Barnevelt judged. When a face looked over the rail of the galley and challenged Shambor, he leaned carelessly against the mast and called back:

"A courier of the Mejrou Qurardéna, with a consignment and a message from Queen Alvandi of Qiríb for Sheafasè, chief of the Sunqaruma."

"Heave to alongside," said the face. Presently a rope ladder tumbled down to the *Shambor's* deck and the owner of the face, a man in a helmet and a pair of dirty white shorts with an insigne of rank slung round his neck on a chain, followed. Several other Sunqaruma leaned over the galley's rail, covering the *Shambor's* deck with cocked crossbows.

"Good afternoon," said Barnevelt pleasantly. "If you'll step into the

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cabin, sir, I'll show you our cargo; and perhaps a drop of some of Qiríb's worst falat-wine will lessen the tedium of your task?"

The inspector looked suspiciously at Barnevelt, but carried out his inspection, accepted the drink with a grunt of thanks, and sent the *Shambor* on its way with one of his men to act as pilot.

Up the channel they crept, the oarsmen looking nervously over their shoulders between strokes towards the mass of ships and other floating structures that loomed a couple of hoda ahead. From among these structures several thin plumes of smoke arose, to hang in the stagnant air, veiling the low red sun.

To one side of the channel a tubby little scow was engaged in a curious task: A chain ran from the scow to the shell of a sea creature something like an enormous turtle flipping itself slowly along the edge of the terpahla and eating the vine with great chomps of its beak. The men in the scow were guiding the creature with boathooks. Barnevelt aimed his Hayashi camera at the creature, wishing he could stop to get better acquainted with it.

"That," said Zakkomir with a glance over his shoulder to make sure the Mourya Sunqaru at the tiller in the stern was not within hearing, "is how these villains keep the vine from overrunning their channel and trapping 'em. What shall we do if our scheme miscarry? Suppose, for ensample, the *Shambor* be forced to flee ere our mission be accomplished, leaving us in the pirates' hands?

Barnevelt thought. "If you can, try to rendezvous near that derelict sailing raft we came to early this morning. You know the one, Chask?"

"Aye, sir. But how'd one trapped in the Sunqar win to this place of meeting? Ye cannot fly without wings."

"Don't know; perhaps if we could steal a light boat we could pole it through the weed—"

And then they came to where the channel opened out into the most astonishing floating city any of them had ever seen—the stronghold of Sheafasè.

IX.

The *Shambor* passed another scow, a big one, piled high with harvested terpahla. The smell of the drying vine reminded Barnevelt of a cow barn back in Chautauqua County. A man sat on the end of the scow, smoking, and idly watched the *Shambor* go by.

Then came the war galleys of the Moryá Sunqaruma, moored in neat rows according to class. Adjacent to them, and spreading out in all directions through the mass of weeds and derelicts, were the hulks the Sunqaruma had converted into houseboats. Among these were rafts and craft made of timber salvaged from older hulls. This timber, by reason of variation in its age and origin, came in divers hues and gave such vessels a striped look.

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Beyond the nearer craft, and barely visible between them, lay a complex of rafts and boats whose nature was indicated by the smoke and stench and sounds that issued from it—the factory where terpahla was rendered into the janrú drug.

A web of gangboards and ladders interconnected the whole great mass of ships living and ships dead. On the decks of the houseboats women moved and children played, the toddlers with ropes around their waists in case they fell overboard. The smell of cooking hung in the still air.

Barnevelt whispered to Zakkomir: "Remember, the go-ahead signal is: 'Time is passing.'"

Now there were Sunqaro ships on all sides. Barnevelt, looking sharply at them, concluded that the surest way to tell which was still capable of movement was to observe whether the vine had been allowed to grow right up to the sides of the ship or whether a space of clear water, wide enough to let oars ply without fouling, had been maintained around it. He estimated that the Sunqaruma had twenty-odd warships, not counting dinghies, supply ships, and other auxiliaries.

The Sunqaru in the stern guided the *Shambor* towards a group of the three largest galleys to be seen, moored side by side—ships comparable to Madjbur's *Junsar* in size. By directing the *Shambor* to starboard the pilot went around this group to where a small floating pier rested on the water beside the nearest quadrireme.

"Tie up here," said the steersman.

As the crew of the *Shambor* did so, the man who had piloted them jumped to the pier and ran up the gangway leading to the galley's deck to converse with the sentry there. Presently he came down again and told Barnevelt:

"You and such of your men as are needed to carry yonder chest shall mount this plank to the ship's deck and there await our pleasure."

Barnevelt jerked his thumb. Four of his sailors took hold of the ends of the carrying poles along each side of the chest and straightened up with a grunt. Barnevelt, followed by the men, stepped onto the pier, Zakkomir bringing up the rear. At the gangway there was some fumbling and muttered argument among the sailors, because the structure was not wide enough for them in their present formation, and they had to crowd between the ends of the poles to make it.

On the deck of the ship they put their burden down and sat upon it. The rowers' four-man benches were empty, and the oars were stacked beneath the catwalk, but there was some sort of activity in the deckhouse forward. Presently a man wearing the insigne of a higher officer came to them and said:

"Give me your letter to the High Admiral."

Barnevelt replied: "I'd be glad to, except that my orders are to deliver these things in person to Sheafasè. Otherwise Queen Alvandi won't consider any reply germaine, because

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she wants to know with whom she's dealing."

"Do you presume to give me orders?" asked the officer in an ominous tone.

"Not at all, sir. I merely repeat what she told me. If you don't want to deal on those terms—well, that's for you and her to settle. I'm neutral."

"Hm-m-m. I'll see what says High Admiral Sheafasè."

"Tell him also the queen demands that I see the Princess Zei, to satisfy myself of her condition."

"You demand but little, don't you? 'Twill not astonish me if he has you thrown to the fondaqa."

"That's the chance we take in my business," said Barnevelt with ostentatious unconcern, though his heart pounded and his knees wobbled.

The officer went away, over the plank to the next galley. Barnevelt and his five companions waited. The sun, a red ball in the haze, touched the horizon and began to slide below it. Barnevelt, who had been surreptitiously shooting film, regretted its passing from a cinematic point of view—the Hayashi being a poor performer at night—even though darkness would much improve their chances of escape.

After the sun had disappeared and Karrim, the nearest and brightest of the three moons, had risen palely in the eastern sky, the officer came back and said:

"Follow me."

The sailors shouldered their burden and followed Dirk and Zakkomir across the deck and the gangplank to the next galley. Here the officer led them forward to the big deckhouse between foremast and bow. A sentry opened the cabin door to let them in.

As he passed the sentry, Barnevelt started—the man was Igor Shtain.

Although he had been half-consciously bracing himself for a meeting with Shtain, Barnevelt almost staggered at the sight of his boss. He hesitated, staring stupidly and waiting for some sign of recognition, while the others crowded up behind him.

Had Shtain genuinely joined the pirates, and if so would he denounce Dirk? Was this his method of getting into the Sunqar for professional purposes? Or had Barnevelt made a mistake?

No; there was the same wrinkled skin—its ruddiness apparent even in the twilight—the same staring blue eyes, the same close-clipped mustache the color of slightly rusted steel wool. Shtain did not even try to pass himself off as a Krishnan by wearing false antennae on his forehead, though he had on Krishnan clothes.

Shtain, saying nothing, returned Barnevelt's gaze with a blank stare of his own.

"*Ao,* Master Gozzan!" said Zakkomir behind him. Dirk awoke and stepped over the raised sill of the cabin door.

Inside, lamps had been lit against the failure of the daylight. In the

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middle of the cabin was a plotting table, around which stood three figures. One was a tall Krishnan in a garment like a poncho—a big square of fabric with a hole in the middle for his head and a labyrinthine pattern around the edge. Another was another Krishnan, shorter and in shorts.

The third was a reptilian Osirian, much like the Sishen whom Barnevelt had met in Djazmurian. This one, apparently, had abandoned what to Osirians were the decencies of civilized life, for he wore no body-paint upon his scales. Barnevelt knew him at once for Sheafasè.

Barnevelt struggled to swallow to lubricate his dry mouth and throat. He was frightened less of the hell that was due to break loose shortly than with the fear that, in a situation that was becoming so complicated, he might absent-mindedly overlook some obvious factor and hence bring them all to disaster.

The sailors set down the chest upon the floor. He of the poncho said in a strange dialect:

"Let the sailors go out and wait upon the deck."

The officer who had let them into the cabin shut and bolted the door, then got out writing materials from a drawer in the plotting-table. Barnevelt guessed this man to be some sort of aide or adjutant, while the other three Sunqaruma really ran the outfit.

"Your message." It was the dry rustling voice of the Osirian, barely intelligible.

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Barnevelt plucked the queen's letter out of his jacket and handed it to Sheafasè, who in turn handed it to the adjutant, saying: "Read it."

The adjutant cleared his throat and read:

"From Alvandi, by the grace of the Goddess Varzai queen of Qirib, et cetera, et cetera, to Sheafasè, Chief et cetera. Astonished and chagrined are we that in a time of peace between yourselves and us, your people should commit the wicked depredation of entering our city of Ghulindé, robbing and slaying our citizens, and seizing the sacred person of our daughter, the royal princess Zéi.

"Therefore we demand, on pain of our dire displeasure, that you forthwith release the princess, and either return her to our territory by your own expedients, or permit the trusty bearers of this message so to do. Further we demand sufficient explanation of this base predacious act, and satisfaction for the wrongs inflicted on our blameless subjects.

"Should there, however, lie between us matters wherein you deem yourself offended, our door stands ever open for the hearings of legitimate complaints. To prove that not even this felonious deed has yet exhausted the reservoir of our good will towards yourself. We do by these trusty couriers send a liberal gift. Their orders to you in person to give this message and its accompanying largesse; from you in person cogent answer to receive; and not willingly to depart from you until the princess in the body they have seen, and received assurance as to her condition."

Silence ensued for several seconds. Barnevelt felt that the queen had made herself look rather silly, starting out full of fiery indignation and demands and ending weakly with a tender of tribute and an implied promise to pay more. Yet what could the poor lady do? She was trying to beat a full house with a pair of deuces.

He stepped forward, unlocked the chest, and lifted the top. The Sunqaruma crowded around it, peered in, picked out a few pieces and held them up to the windows or the lamps to examine them more closely, and ran their fingers through the coins. Barnevelt hoped they would not remark the disparity between the size of the treasure and the size of the chest. For while the treasure was considerable both in value and weight, gold is dense, and in a chest the size of a small Earthly trunk it barely covered the bottom.

Finally Sheafasè stepped back saying: "Attention, gentlemen. Agree we not that our letter, already prepared, covers all points raised by this message?"

The Krishnan in the poncho made the affirmative head-motion. The Krishnan in shorts, however, demurred:

"Sirs, 'tis my thought we have not given my proposal due consideration. The princess is the key to the wealth of the Zogha, and we shall rue the day we let this key slip through

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fingers trembling from overhaste—" He spoke the Qiríbo dialect.

"Enough, 'Urgan," said the Osirian. " 'Tis also true that many a key has been broken in the lock by turning too forcefully when it did not fit. We can discuss your proposal further while awaiting the old drossel's reply."

While this dialogue had been going on, the adjutant had been taking another letter out of a drawer in a small side table. Now he handed this to Sheafasè, together with writing materials. The pirate chief signed this letter, and the adjutant sealed it up and handed it to Barnevelt.

Sheafasè said: "Receive our answer. In case it should be lost under the flail of fate before you can deliver it, tell Alvandi this: That we'll keep her daughter safe from harm on two conditions. One: that the contract relevant to the sale of janrú be amended by a rise in price, for the late increase in costs to compensate. And two: that she render unto us the persons of two vagabonds who now frequent her court, calling themselves Snyol of Pleshch and Tagde of Vyutr. As for releasing the princess, that's a matter wanting more consideration. The letter furnishes details."

Barnevelt heard Zakkomir at his side start as he digested this demand. Barnevelt thought: How about the famous Osirian pseudohypnosis? Sheafasè might have worked it on Shtain, and now want to get hold of George Tangaloa and himself to apply it to them, thus neatly ending their investigation of the Sunqar and, furthermore, making thrifty use of them by turning them into Sunqaro pirates. Or, more likely, Shtain had been subjected to the treatment before he left Earth, to make him docile.

"I think that's all—" said Sheafasè, but Barnevelt spoke up:

"We haven't seen the princess, sir."

"So you have not. Who, think you, is in a situation to make demands?"

"Wait," said the short Krishnan addressed as 'Urgan. " 'Tis not unreasonable, and won't hurt us. Do we refuse, the harridan'll think we've fed her daughter to the fondaqa, and negotiations will drag on forever while she tries the truth to learn."

He of the poncho said: "Let's decide quickly, for my dinner cools."

After a brief confab among the bosses of the Moryá Sunqaruma, the adjutant opened the door and spoke to the man on guard. Barnevelt heard the latter's footsteps going away.

"May we smoke while waiting?" asked Barnevelt.

Receiving permission he passed his cigars around. Everybody took one except the Osirian. To help conceal his emotions, Barnevelt lit his stogie on the nearest lamp, drawing long puffs from it. Outside the twilight faded.

Footsteps approached again. The door opened, and in came Shtain, holding Zéi firmly by his arm. Barnevelt thought his heart would burst through his chest, mailshirt and all.

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She still had on the flimsy tunic she had been wearing the night of the kashyó festival, though the coronet and other ornaments had disappeared, no doubt into Sheafasè's treasury.

Barnevelt heard Zéi's breath catch as she recognized the "couriers," but like a good trouper she said nothing. Barnevelt and Zakkomir each touched a knee to the floor in the perfunctory manner in which one would expect a busy expressman to pay homage to captive royalty. The adjutant briefly explained the circumstances to her.

While the time for action was fast approaching, thought Barnevelt, the presence of Shtain would complicate matters. Barnevelt couldn't very well turn to Zakkomir, standing tense beside him, and say aloud: "When the time comes, don't kill the Earthman. Just knock him cold because he's really a friend of mine."

He moved, as though from sheer restlessness, to place himself between Shtain and Zakkomir. Shtain, looking up at his face as he passed, said:

"Have I not met you elsewhere, courier?" As Dirk's heart rose into his mouth, Shtain turned away, muttering: "Some chance resemblance, I suppose—"

Barnevelt almost laughed aloud at the sound of his chief's speaking Gozashtandou with a thick Russian accent. Phonetics was not the intrepid Igor's strong point.

"Tell my lady mother," said Zéi, "that I'm sound of wind, limb, and maidenhood, and have not been ill-treated, though the cookery of this swamp-city makes a poor showing in comparison with ours in Ghulindé."

"We hear and obey, princess," said Barnevelt. He scratched his person and turned to Sheafasè: "Our mission seems to be accomplished, lord, and therefore if you'll let us take aboard some drinking water we'll push off. Time is passing—"

Barnevelt had continued to scratch, and now to compound his ungentlemanly behavior he reached inside the lower edge of his shorts, at the same time taking a big drag on his cigar. His hand came out of his pants-leg grasping one of the smoke bombs, which had been strapped to his thigh, though since it was a big hand and a small bomb its nature was not immediately evident to those about him. With a quick motion he applied the fuse to his cigar until it fizzed.

Then with the bomb still in his fist he swung a terrific uppercut at Shtain's jaw.

The blow connected with a meaty sound, and the explorer slammed back against the wall and slid into a sitting position. Then Barnevelt tossed the bomb to the floor and reached down inside his boot for the little folding sword. Zakkomir had already whipped out his.

Barnevelt straightened his blade with a click of the latch just as the bomb went off with a *swoosh,* filling the room with smoke, and the remaining Sunqaruma burst into cries of warning and alarm and reached for their own weapons.

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Nearest to Barnevelt, now that Shtain had been disposed of, stood the adjutant, drawing his sword. This weapon was only just out of its sheath when Barnevelt's lunge went home, the blade sliding between the ribs and going in until stopped by the hinge. Barnevelt jerked it out just in time to meet the attack of Igor Shtain, who had gotten back on his feet, coughing from the smoke and shaking his head, and now pressed forward. Although not much of a fencer, Shtain swung his cutlass with a force that threatened to break Barnevelt's little toy at every parry. Moreover he had the advantage that Barnevelt was trying not to kill him, while he labored under no such inhibition.

The short Krishnan, the one called 'Urgan, had been quick to reach for his hilt, but Zéi seized his right wrist and hung on before he could get his blade free. He had finally thrown her off, but then Zakkomir's point had taken him in the throat. Then Zakkomir was engaged with the man in the poncho, both coughing.

Barnevelt cast a longing glance at the sword of the man he had killed, wishing he could snatch it up in place of the one he was using, but he had no chance to do so. Shtain was driving him into a corner. In desperation he threw himself into a *corps-à-corps* and struck with his free fist at Shtain's jaw, hoping to knock his man out. Shtain's jaw, however, seemed to be made of some granite-like substance. In fighting with Shtain, Barnevelt realized that the slight advantage he had over Krishnans, in consequence of having been brought up on a planet with a gravity about one-tenth greater, was canceled out.

Sheafasè, who alone of the males in the room was not armed, came around behind Zakkomir and seized his arms. The man with the poncho lunged. Zakkomir, though pinioned, managed to deflect the first thrust. On the *remise* the man in the poncho got home, but Zakkomir's mailshirt stopped the point, the blade bending upward into an arch. Sheafasè tightened his grip. The man in the poncho drew back his arm and aimed for Zakkomir's undefended throat.

However, Zéi had picked up a light chair that stood in a corner and now brought it down on Poncho's head. The man drooped like a wilted lily. A second blow brought him to hands and knees, and a third flattened him. Zakkomir continued to struggle to get loose from Sheafasè.

Barnevelt, still straining in his *corps à-corps*, pushed Shtain off balance with his shoulder. As Shtain staggered, Barnevelt got a grip around his body with his left arm and freed his blade. The silver helmet went *glonk* as Shtain struck it with his cutlass. Then Barnevelt brought his right fist, which still held his sword, into action. A series of punches to the ribs, the jaw, the neck, and a final blow to the head with the brass pommel brought down Shtain for good.

Barnevelt whirled and leaped to Zakkomir's assistance. From the

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other side Zéi had already whanged the Osirian in the ribs with the chair. As Barnevelt stepped around the plotting table, Sheafasè tried to swing Zakkomir's body as a shield. But Barnevelt reached around his companion and thrust his point into the scaly hide. Not far—a centimeter or two. As Sheafasè backed up with a shrill hiss, Barnevelt followed, saying: "Behave yourself, worm, or I'll kill you too."

"You cannot," said Sheafasè. "You are under my influence. You are getting sleepy. You shall drop your sword. I am your master. You shall obey my commands—"

Despite the impressiveness with which these statements were delivered, Barnevelt found he had no wish to obey the Osirian's commands. Zakkomir, too, now had his point in Sheafasè's skin, and between them they backed him against the wall. The whole fracas had taken less than a minute.

"It's these helmets," said Barnevelt, remembering what Tangaloa had told him about Osirian pseudo-hypnosis. "We needn't be afraid of this lizard. Zéi, open the door a crack and call my sailors."

As the sailors approached, the man in the poncho groaned and moved.

"Kill him, Zéi," said Barnevelt, a little surprised at his own ruthlessness. "Not that one; this one."

"How?"

"Pick up his sword, put the point against his neck, and push."

"But—"

"Do as I say! D'you want us all killed? That's a good girl." Zéi threw the bloody sword away with a shudder. "Now," continued Barnevelt, "tie and gag the one who brought you here, the Earthman. I'll explain why later."

The four seamen stepped over the raised sill of the cabin door and halted as their eyes became accustomed to the dim light of the smoke-filled room and they took in the tableau from the last act of "Hamlet." They chirped with surprise.

Barnevelt said: "Boys, shut the door and dump all this trash out of the chest. No, don't stop to pick up pieces! And don't let this monster look you in the eye, if you want to live."

The chest was tilted over and the treasure slid out on the floor with a jingling crash.

Barnevelt continued: "Help the princess to tie that fellow up. Did you hear anything?"

One sailor said: "Aye, sir, we heard a sound as of voices raised, but nought that seemed to call for interference."

Zéi said: "Be your purpose to carry me out in that chest?"

"Yes," said Barnevelt. "But—let me think." He hadn't planned on taking both Zéi and Shtain, but he could hardly leave either without trying. He told the sailors: "Put the Earthman in the chest. Push him down as far as he'll go. Now, Zéi, see if you can fit in on top of him."

"Such vulgar intimacy with a stranger, and so unprepossessing a

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wight, too," she said, but climbed in nevertheless.

The lid would not go down with both, however.

Zakkomir said: "If you want the Earthman, leave him in the chest, and let the princess walk with us as though she had been ransomed. And let's escort the monster with our blades at ready, making a sweep of all three."

"Good," said Barnevelt. "Admiral, you're coming with us. You shall walk to our ship with my friend and I on either side, and at the first false move we let you have it."

"Where will you let me go?"

"Who said anything about letting you go? You shall have a voyage on my private yacht. Ready?"

The sailors picked up the chest containing Shtain. Barnevelt and Zakkomir each took Sheafasè by one arm, holding their small swords hidden behind their forearms, the points pricking the Osirian's skin. Behind them came Zéi and the sailors.

The party walked aft to the gangplank that led to the next galley. They proceeded across this plank, then across the deck of the adjacent galley to the gangplank that led down to the floating pier at which the *Shambor* was tied up.

As they neared the latter companionway, however, heads appeared over the edge of the smaller galley, followed by the bodies of men coming up from the pier. At first Barnevelt thought they must be a party from his own ship. However the light was still strong enough to show that they were not his men at all. A glance over the side of the quadrireme disclosed the mast of another small ship tied up to the pier next to the *Shambor*.

Barnevelt whispered: "Careful!" and pressed the point of his sword a little further into Sheafasè's hide. He drew the Osirian to one side to let the other party pass.

The first member of the other party, going by at a distance of about two meters on the deck of the galley, started to make some sort of saluting gesture towards Sheafasè—and then stopped and yelled "You!" in a rasping voice, looking straight at Barnevelt.

It was, Barnevelt saw, his old acquaintance Vizqash bad-Murani, the ex-salesman, against whose occiput he had shattered the mug in Djazmurian.

With a presence of mind that Barnevelt in calmer circumstances might have admired, Vizqash whipped out his sword and rushed. Barnevelt instinctively parried, but in doing so he loosened his grip on Sheafasè, who instantly tore himself free. Zakkomir thrust at the reptile as he did so, inflicting a flesh-wound in the Osirian's side.

The other men of Vizqash's party ran in to help. The first to arrive struck at one of the sailors from the *Shambor*. His blade bit into the man's neck, half severing it, and the sailor fell dead. The other three dropped the chest, which landed on its side with a crash. The lid flew

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open and Shtain rolled out on deck.

Barnevelt parried a thrust from Vizqash, then got his point into his antagonist's thigh on the riposte.

"Run!" yelled Zakkomir.

As the wounded Vizqash fell, Barnevelt snatched a quick look around. Zakkomir was starting to drag Zéi off. Sheafasè was dancing out of reach and whistling orders to the Sunqaruma, who were rushing upon the invaders. The three surviving sailors were running away; one dove over the rail. Hostile blades flickered in the twilight.

Barnevelt ran after Zakkomir and Zéi, who bounded onto the gangplank leading to the big galley on which they had conferred with the pirate leaders. The three raced across the plank, then across the deck, and then across the plank to the third big galley. Feet pounded behind them.

"Hold a minute!" yelled Barnevelt as they gained the deck of the third galley. "Help me—"

He cut the ropes that belayed the end of the gangplank to the deck of the third ship. Then he and Zakkomir got their fingers under the end of the plank. A couple of Sunqaruma had already started across it from the other end, adding to the weight. With a mighty heave the two fugitives raised their end of the plank and shoved it free of the side of the ship. Down it went with a *whoosh* and a splash, and down went those who had started across it, with yells of dismay, into the weedy waters below.

A crossbow-bolt whizzed past. Barnevelt and his companions ran to the other side of the ship they were on. Here a ladder led down the side of the ship to a scow, and from both ends of the scow a series of rafts led off into tangles of houseboats and miscellaneous craft.

"Which way?" said Barnevelt as they gained the deck of the scow and paused, panting.

Zakkomir pointed. "That's north, the direction of that raft. You and Zéi go to the next raft and crouch down out of sight, and when they come along I'll lead them in the opposite direction. Then can you and she try for our rendezvous."

"How about you?" said Barnevelt uncomfortably. Not that he was keen to send Zakkomir off with Zéi while he himself played the part of red herring, but it seemed hardly decent to let the young man sacrifice himself.

"Me? Fear not for me. I can lose them in the darkness, and under your inspiring leadership have I attained the courage of a very Qarar. Besides, my first duty's to the dynasty. Go quickly, for I hear them coming."

He pushed them, half unwilling, to the end of the scow. Unable to think of a better scheme, Barnevelt dropped down to the raft with Zéi and hid under the overhang of the scow's bow.

Then sounds of pursuit increased, indicating that the Sunqaruma had brought up another plank to replace the one thrown down. Zakkomir's footfalls receded, and cries of:

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"There he goes!" "After him, knaves!" told the rest of the story.

When the noise died down, Barnevelt risked a peek over the end of the scow. People seemed to be moving in the distance, but the light was too far gone to tell much. He grasped Zéi's hand and started off in the direction opposite to that which Zakkomir had taken.

TO BE CONCLUDED

IN TIMES TO COME

Dianetics is not the business of this magazine; science fiction is. But inasmuch as new sciences are necessarily of great interest to any group of people interested in the future, in how man's civilizations will or may develop, dianetic articles are naturally of interest. But the principal effect dianetics seems to be having on the magazine at the moment is this: it is a time-consuming process, and many of our top authors are evidently deep in the work.

We've rather permanently lost René Lafayette and L. Ron Hubbard of course. A. E. Van Vogt is now the manager of the Los Angeles department of the Hubbard Dianetic Research Foundation, and temporarily, at least, too busy to write much. But it will be highly interesting to see what comes of this work in the coming year!

But to quell the flood of off-track manuscripts that hit the office shortly after the May issue appeared; we are interested in science fiction. Stories, not gimmicks, theories, or author's names make salable material. We have no formula or requirement save the one single one that it be a good yarn. But we do have a general effort in the background; we don't like monotony. Atomic war stories have grown a bit monotonous—kind of like a bad joke we've heard before and it wasn't funny the first time; please don't repeat the same old theme. The same applies to any theme; our aim is good science fiction, with all the near-infinite variety of themes that permits.

As a matter of fact, next month's issue wanders from L. Sprague de Camp's horseplay opera "The Hand Of Zei," Part III, through James Blish's "Bindlestiff," a sequal to "Oakie" concerning the wandering city of space, to "Foundling," which, while concerned with an atomic bomb, is more an insoluble-dilemma story than a war story.

I've gathered you like variety; I know I do.

THE EDITOR.

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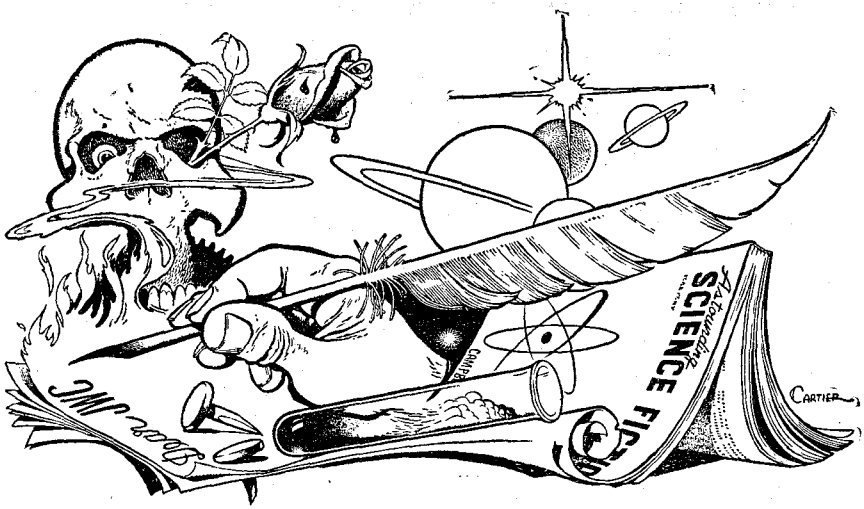

BRASS TACKS

I have been a regular reader of Astounding SCIENCE FICTION ever since it was first published and while I have never written to you before I feel that your June, 1950 issue which I have just finished reading, has without a doubt made a find in the artist who drew your June cover, and the illustrations for "Incommunicado."

While your stories have always been of a superior quality, the illustrations accompanying them have certainly not indicated that much internal research was conducted by your illustrators. It was, therefore, quite refreshing to find such a high degree of illustrative co-ordination with the theme of Katherine Mac Lean's novelette.

Whoever "Miller" is please convey to him my compliments for a depth of conception, and to you, Mr. Editor, our desire for more of such excellent accompanying illustrations. —B. F. Klein, 815 East Anapamu Street, Santa Barbara, California.

Thanks! More by Walt Miller is coming up!

Dear Mr. Campbell:

As an ardent reader of your magazine I should like to offer a solution to the problem given by Mr. Ronald Friedman of Brooklyn, New York as stated in the July issue of Astounding. This complexity concerns three gentlemen who stop at an expensive hotel which is equipped

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with a dishonest bellboy. Let's consider the events which transpire: First, the men pay the clerk ten dollars each, a total of thirty dollars, for the room. Next, the clerk discovers an overcharge of five dollars and dispatches his untrustworthy minion to reimburse the men in that amount. However, the bellboy keeps two dollars and only returns three to the gentlemen. We are O.K. up to here. Now according to Mr. Friedman, we add twenty-seven and two and get twenty-nine. There's no law against this but what does it have to do with the problem? Nothing! After all, the two dollars kept by the bellboy is included in the total of twenty-seven paid by the gentlemen roomers, the other twenty-five of the total being kept by the clerk. The number "thirty dollars" really no longer concerns us, except as the original amount of money paid. If we do wish to consider the entire transaction, including the refund, there is, of course, no difficulty. Before the transaction, the men have thirty dollars. After the entire series of events has transpired, the men retain three dollars, the bellboy keeps two and the clerk has received twenty-five. Add 'em up and get thirty, the original sum.

The question of the mysterious "other dollar" is resolved; the "other dollar" is a discrepancy caused by adding twenty-seven and two to get the total. This can hardly be regarded as a problem but rather as a series of confusion-inducing statements. There is a strong intuitive inclination, almost compulsion, to regard the aforementioned addition as a reasonable method in the problem but, when viewed more carefully, the operation is seen to bear no relation whatsoever to the desired total. Usually, if the reader attempts to note and *justify* each step in situations like these, any seeming paradoxes will forthwith be resolved. Astounding fan that I am, that year's subscription guaranteed by Mr. Friedman will certainly be appreciated.

As is customary in these cases, I will present a counter-problem. To wit:

A girl, named Mary, was employed one day as a secretary of a men's club. "Forsooth," thought Mary to herself, "I am a secretary of an organization of which I am not a member." "It would be fun," she thought, "if I could form a club whose members would be those people and only those people who are secretaries of organizations of which they are not members." Such a club was formed and, during the course of events, an election of officers was held. Now the question is, who was elected secretary?

Perhaps that will prove interesting to some of your readers.—Rudolph Powell Jr., 2428 Glyndon Avenue, Venice, California.

"Is the class of all classes not members of themselves a member of itself?"

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Dear Mr. Campbell:

I read the article on atomic waste disposal and the dangers of exposure to radioactive materials and felt it was a good thing that this matter was brought to the attention of the public. However, as I read through it, I continually expected to find one particular danger emphasized and was rather disappointed at its omission, for it is important enough to be included, even in an article of this brief scope.

The limits to which various life organisms can be exposed and still survive were quite clearly stated—but, the lower limits under which future life (offspring of those exposed) could survive (be nonmutant) were not mentioned. For example, even continued exposure to X-ray radiations from the machines found in many shoes stores, most of which are inadequately shielded, can produce radical mutations in the gene structure.

Quite a few of your stories deal with a future world, populated by mutants, which is caused by an atomic war—*but,* in a peaceful, atomic-powered world, the same result can also be very easily caused by ignorance of "how hot is hot."

The importance of a public education program on the dangers of exposure, both to present and to future life, cannot be overemphasized. I am very happy to see that your magazine is again in the lead with articles of this type.—Dillard Glanton, 5500 Kansas Avenue, Omaha 4, Nebraska.

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Those shoe store X-ray machines are very genuinely dangerous devices. They use heavy X-ray dosage.

Dear Mr. Campbell:

I purchased the July issue of ASF today and, having read it, formed a conclusion to write and express three ideas. To begin with, your article "Intellectual Hobson - Jobsonism," struck me as being both an extraordinary piece of writing and a very timely article. The latter particularly so, since I have recently been engaged in dianetic therapy, both as patient and auditor, and have come up against some examples of this fitting of a new idea into an old niche for the sake of "Peace of Mind" on numerous occasions, particularly attempts to distort Dianetics upon the rack of Freudian psychiatry and to establish it as merely another form of narco-synthesis.

The second point I wish to mention is that in conjunction with the Hubbard Dianetic Research Foundation, ASF might well devote a few pages or at least paragraphs in each monthly issue to a survey of progress made in the field of Dianetics. I assure you that this would be most welcome to myself and to numerous other persons I might mention. Furthermore, in first informing the public of Dianetics, I feel that you have incurred the obligation to keep this public further informed.

Finally, I wish to make a few suggestions along the lines which you mentioned in the Analytical Laboratory report of July. Namely, what types of fact articles the readers would prefer. I, for one, would be interested in seeing more articles on Dianetics, Cybernetics and Reaction Engineering. And also, God willing, let us have some more tales by E. F. Russell, Asimov, Van Vogt, and, above all, Mr. Heinlein.

And you deserve laurels for the July issue. It is by far the best you have published in quite a while!—Robert Kelly, 633 Crescent Street, Brooklyn 8, New York.

The Dianetic Foundation is publishing bulletins on new dianetic techniques. That is not our province. We are publishing general articles on the mind; they are science articles of general interest. But this magazine's business is science-fiction. A separate dianetics journal will be needed, and will properly be published by the Foundation, not as a newsstand magazine.

Dear Sir:

Your article "Linguistics and Time" stimulates the present letter. It called to mind a reference to the Hopi time concepts in Hiakawa's "Language in Action"—book-of-the-month club selection a few years ago—and started the present train of thought.

Over the past years I have been gradually assimilating the content of four books which I have hoped would to some extent emancipate my thinking from the more severe effects of

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dependence on the peculiarities of a language. These four are (1) Hiakawa's book mentioned above. (2) "The Meaning of Meaning," by Ogden and Richards. Tough sledding, but well worth the trouble, as it deals with exactly what happens when we use a word or make a sentence. (3) "Philosophy in a New Key," by Suzanne K. Langer. This was recently reprinted by Penguin Books as a thirty-five cent "Pelican." It is not as hard as Ogden and Richards, and some of it is beautifully written. It treats in general of the logic of symbolism. And (4) Korzybski's great "Science and Sanity."

I obviously have been trying to do for myself, with great difficulty, what the dianetic therapy should be able to do a great deal of with greater ease. Or, at least, a "clear" should be able to assimilate this sort of thing more easily than I. I have been thinking that the newly freed personalities would benefit more than most of us from these considerations of language, which is to a great extent the substance of our thought.

I write because I think that your readers, at least the more mature, should know about these books, and partly because I would like to find more in your articles and discussions that pertains to symbolic logic and to cybernetics. I think that between the new dianetic therapy and a good public understanding of language function, a true "science of man," as envisioned by Korzybski, might be the salvation of a rather precarious civilization.

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An additional inquiry: I have long been trying to buy a copy of Lucien Levy-Bruhl's "How Natives Think"—English translation—which I think would become a part of the cycle mentioned above. Is there a chance that an A.S.F. reader could lend or sell a copy? Incidentally, why not start a clearing-house for book wants? Just accept and list inquiries such as this, with name and address of inquirer and whether he wants to buy or borrow? It could be done in very little space.

I should explain. I don't sell books, and I don't teach languages. I'm just a biology professor.—H. E. Calkins, Box 442, Athens, Georgia.

I'm afraid to try starting a book clearing office! Knowing our readers, I can safely bet we'd be swamped!

Dear Mr. Campbell:

H. Beam Piper's "Last Enemy," based on spiritualism and reincarnation, is a fraud on your readers and I very much resent it.

This is more than a matter of taste, for it includes two paragraphs of seriously presented "fact" about our real world, that "justifies" in a way that may seem "scientific" to many readers, mass extermination of a large part of humanity.

For, as the story says, "A series of all-out atomic wars is just what that sector needs, to bring their population down to their world's carrying capacity . . ."

We could shrug this off as nonsense, but atomic war *is* a real danger and William Vogt *has* written a best-seller based on the same anti-human idea.

The facts are quite different. True, three-fourths of humanity is hungry. But does it have to be?

With the methods in use today it takes about two fifths of an acre of cultivated land to feed one person. Actually we only cultivate about one sixth of an acre per human. But we are now using only ten percent of the earth, and agriculture is practical on at least thirty percent of the earth, even if we only consider areas with favorable soil and climate. If we used the land now available, we could feed everybody and twenty percent more besides.

And this is without considering that with modern methods, as compared with those generally in use, the yield per acre can be increased tremendously.

Suppose, through modern methods, the yield per acre were increased two and one half times—this is figuring modestly. And suppose we tripled the area in use. Our planet could then keep full stomachs in over six and one half *billion* people, more than *triple* our present population.

Furthermore there are the Arctic Regions, the Sahara, the deserts of Australia and central Asia, the forests of the Amazon and other waste lands. Science already knows precisely how to conquer these spaces for the use of mankind.

The job is waiting to be done.

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As for "Our Plundered Planet," it is not Nature that exhausts our forests and soil, it is the methods we ourselves have used and are using. With different methods, known to science already, the plundering can be stopped and the fertility of our soil can be built up almost indefinitely.

Let's have some real *Science-fiction*—stories of belief in humanity.

Mankind, that has solved the scientific problems of an abundant life, is not going to be licked by the engineering details.—Theodore Vincent, 1614 West 12th Street, Brooklyn, New York.

Astounding Science Fiction does not accept responsibility for the beliefs of paratimers from other time-levels and alien sectors!

———

Dear JWC:

On page 130 of the August issue in my article "Linguistics And Time," there is a "typographical" error which I'm afraid I can't blame on the typesetter: The statement is made that, concerning the Hopi Language, "It does not permit expressions of similarity"; actually, that last word should be *simultaneity*. Most likely, it's my fault; I have another copy of the manuscript—the error does not appear on it—but it is not a carbon, so I can't be sure. Fortunately, the point is repeated on the following page with the correct phraseology, so the interested reader will catch it.

I have discovered, incidentally,

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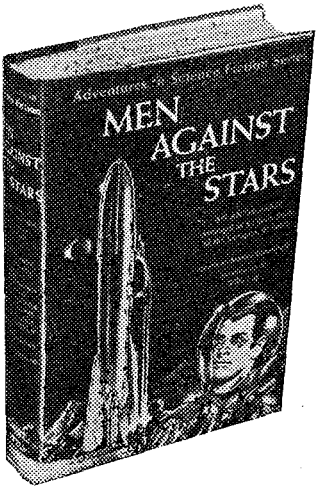

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that the Hopi system is not totally unique. Recently, I ran across a most remarkable paper by D. Demetracopoulou Lee entitled "A Linguistic Approach To A System Of Values," published in *Philosophy of Science,* 1940, VII, 355-365. Dr. Lee —a woman, by the way—makes an analysis of the Trobriand language based upon the work of the late Dr. Bronislaw Malinowski, who gained world fame through his many books and monographs on these people. Her paper represents an important contribution for several reasons, chief among which is that it is one of the few attempts to show the relationships existing between language-structure and a culture-as-a-whole. In doing so, she was in implied conflict with Dr. Malinowski, himself, who believed that linguistic form held no valid clue to cultural structure—an opinion with which I, too, dare to disagree.

Dr. Lee, in her examination, shows that the Trobriand language handles events or objects as elements separate from all others and, concomitantly, has no mechanism for showing cause-and-effect relationships. The function of a language is the "showing of relationship" — or categorizing — but the Trobriander avoids that function as much as is possible; his sentences are composed of essentially disparate and unrelated words and in his speech he rarely compares, does not express casuality or telic relationships and feels no *conventional* urge to go beyond a fact into its implications or relationships.

Along with this, the Trobriand language does not contain any tenses. In this respect, it is essentially similar to the Hopi language-structure, and, as we might expect, is supported by the same mechanisms, wherein the modal or aspectual, not the temporal, phase of an event is brought forward. Of course, they don't have identical structures, having certain distinctions, but they are interestingly similar. Like the Hopi, duration for the Trobriander also cannot be given a number greater than one; Dr. Lee, however, discovers this by investigating the language from a different standpoint—that of examining the adjectival forms (rather, the *lack* of them) in the language. This bears out our rather "obvious" contention that language-structure is interrelated, that each "element" is dependent upon the others; I suspect that all "tenseless" languages might have similar structures to these two — though, there is no way to prove this assumption, at the moment. Dr. Lee goes further than the "interrelatedness of language" to show how the Trobriand society reflects the structure of its language, and vice versa.

Dr. Lee gives no indication of being familiar with Whorf's work, which was published at about the same time as hers, independently of any study of the Trobriand language.

Kahn's letter on the Dobu is most

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interesting. I wonder how many readers are going to be puzzled by the similar ideas "popping up" in so many stories and articles; there have been several stories and two articles on cultural anthropology and linguistics in the last four issues, alone. It's surprising how quickly the "climate of opinion" in a field can take on a different tone. It's a significant one, I think, and a welcome one.—Arthur J. Cox, 628 South Bixel Street, Los Angeles 17, California.

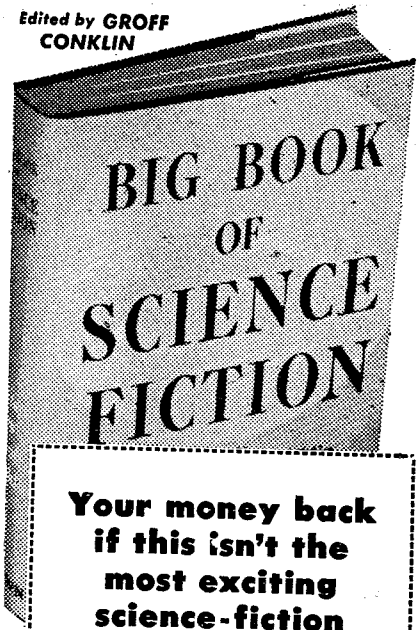
We're both wrong! Cox slipped in this manuscript and I didn't catch it.

Dear Mr. Campbell:

I cannot help feeling disappointed at the manner in which Mr. Coupling handled his article "How To Build A Thinking Machine" in the August issue. He shares the same fallacious reasoning that many others display in the fields of cybernetics and the study of "thinking machines." This fallacy is the habit of applying human standards to nonhuman problems—in fancy terminology anthropomorphism.

Because we humans are accustomed to "solving" mazes by finding the shortest path through them, he assumes that this is "the" solution. He states that we would think more of a machine which made its way through a maze quickly than one which took the long path. Why? Unless the machine is given definite

Edited by GROFF CONKLIN



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instructions to look for the shortest path, it does not show a low degree of machine "intelligence" if it takes all day getting out of a maze. Maybe it would *like* wandering around purposelessly—and with no instructions it might very well follow its own likes.

Statistically speaking, a random method of solving mazes is terribly inefficient. A simple system of left and right corner turning would reduce the needless duplications always present in a random system. It is true that for any regular systematic system of maze solving there may be mazes which might take longer to solve than by the random system. However, if the machine switched systems frequently it would operate much more efficiently, in the long run, than if it used the random method. I think a professional mathematician would agree with these conclusions.

Because we humans need several successes to "learn" a maze, Mr. Coupling concludes that this is desirable. Actually, of course, a machine that learned the first time would be very much superior to us. The only qualification is that the machine would have to be supplied with sufficient information to *know* when it had achieved the solution—then it could immediately file a "learned" set of data.

The electronic "thinking machine" circuit shown is quite ingenious, though the pain and pleasure lights would seem to be strictly useless and beside the point. Intuitively, however, I feel that the circuit is much more complicated than necessary to perform according to the requirements. I am working on a design of my own which I shall send you if it pans out.

Just in case anyone attempts to build the machine described in the article, an error in Figure 3 should be pointed out. There should be a coupling, or plate-blocking condenser between tubes 11 and 12.

Don't get me wrong now, I enjoyed the article tremendously and would like to see many more on the same subject; preferably one concerning a piece of equipment that has actually been constructed and tested. —Lieut. Frank R. Williams.

First-time learning of the optimum answer would, of course, be desirable. But first-time learning—and stubborn clinging to—the wrong, or inadequate answer, is all too characteristic of bad thinking. So let's not *learn the first time and decide that is THE answer.*

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